Medical Lib
JAN 4 1927
Gather

VOLUME 4 NUMBER 6

ARCHIVES OF
OTOLARYNGOLOGY

EDITORIAL BOARD

GEORGE E. SHAMBAUGH, Chicago
ISIDOR FRIESNER, New York
CHEVALIER JACKSON, Philadelphia
EUGENE A. CROCKETT, Boston
ROBERT C. LYNCH, New Orleans
GREENFIELD SLUDER, St. Louis

DECEMBER, 1926

PUBLISHED MONTHLY BY AMERICAN MEDICAL ASSOCIATION, 535 NORTH DEARBORN STREET, CHICAGO, ILLINOIS. ANNUAL SUBSCRIPTION, $6.00

Entered as Second-Class Matter, January 14, 1925, at the Postoffice at Chicago, Illinois, under the Act of March 3, 1879. Acceptance for mailing at special rate provided for in Section 1103, Act of October 3, 1917, authorized January 22, 1925.

NOTICE

1927 SUBSCRIPTIONS NOW DUE

Inserted in this issue of ARCHIVES OF OTOLARYNGOLOGY *is a pink slip. It is a notification that subscriptions for the coming year are now due and payable. Those who have already paid for 1927 naturally will disregard the notice.*

The names and subscription prices of all of the other journals published by the American Medical Association are printed on the slip. This is for the convenience of those who subscribe for more than one journal. The names of the other journals desired may be written on the blank lines or a check mark may be placed in front of the names as printed in the list. The entire amount of the subscriptions for the various publications thus may be covered by one check or draft and sent with the pink slip.

COPYRIGHT, 1926, BY THE AMERICAN MEDICAL ASSOCIATION

ARCHIVES OF OTOLARYNGOLOGY

VOLUME 4 DECEMBER, 1926 NUMBER 6

TUBERCULOSIS OF THE LARYNX

TREATMENT BY SURGICAL INTERVENTION IN THE SUPERIOR AND INFERIOR LARYNGEAL (RECURRENT) NERVE: A REPORT BASED ON SEVENTY-NINE CASES *

HENRY P. SCHUGT, M.D.

NEW YORK

The superior laryngeal nerve, essentially the sensory nerve of the larynx, has played an important part in the treatment of tuberculosis of the larynx during the last two decades; but only for the last five or six years has the recurrent nerve been considered in this connection. I believe it is worth while to go somewhat into detail regarding the part these two nerves play.

SUPERIOR LARYNGEAL NERVE

The relief of the pain on swallowing is of the utmost importance in the treatment of laryngeal tuberculosis, because as a consequence of the pain there is a diminished intake of food, leading to the rapid failing of the patient. For a long time attempts have been made, by the application of various remedies to the larynx, to make the lot of the patient bearable. However, these local applications must be made daily, and their efficacy is of short duration—if they are at all helpful. Only since Hoffmann [1] introduced the blocking of the sensory nerve of the larynx (the superior laryngeal nerve) by the injection of a strong alcohol solution, has it become possible to relieve the pain in tuberculosis of the larynx for any appreciable length of time. Unfortunately, the success of these injections varies. The duration of the anesthesia and the relief from pain fluctuates, according to the statements of various authors, from a few hours to two months. A further disadvantage of the method is the fact that after the first injection all subsequent injections are less likely to be successful, probably because of the development of connective tissue adhesions. Several authors report that at times the pain reappears with greater severity after an injection of alcohol.

I might mention a complication following the injection of alcohol, which will be explained later, showing that this complication is not due to any fault of the technic, as I at first supposed. In a patient suffering from severe dysphagia I caused paralysis of the superior laryngeal nerve

* These patients were treated at Sea View Hospital, Ear, Nose and Throat Department, Staten Island, N. Y.

1. Hoffmann, R.: Daueranaesthesie im tuberculösen Kehlkopf München. med. Wchnschr. **22**:739-740 (April 7) 1908.

by the injection of alcohol, but in doing so a paralysis of the tongue, on the same side, developed. In four of forty patients who were treated for dysphagia by the injection of alcohol, a mild edema on the diseased side was observed after the operation. I have been unable to find any reports in the literature regarding complications of note following the injection of the superior laryngeal nerve. These injections may, however, be attended at times by risk, as is illustrated in the following case:

CASE 1.—H. D., a woman, had advanced tuberculosis of the lungs. April 28, 1925, there was swelling of the interarytenoid space, of the left ventricular band and of both vocal cords. May 20, the swelling of the interarytendoid space had increased. There was slight pain on swallowing. May 29, electrocautery of the interarytenoid space was performed, and, June 8, electrocautery of the interarytenoid space and of the left ventricular band. Treatment with menthol in oil was given until October, 1925. The patient had pain and difficulty on swallowing. Practically the whole larynx was swollen and ulcerated. She had slight dyspnea.

October 7, at 9 a. m., alcohol was injected into both superior laryngeal nerves. The patient was able to swallow water and milk without pain immediately after the injection. About forty-five minutes later, she developed severe dyspnea. Examination of the larynx showed severe swelling of both arytenoids and aryepiglottic folds. I had to resort to tracheotomy at once.

An absolutely safe method of freeing the patient permanently from pain on deglutition is by resection of the superior laryngeal nerve. This method was first resorted to by Avellis in the year 1909 for the relief of dysphagia in laryngeal tuberculosis. I have performed this operation on twelve patients. Relief from pain was complete in every instance.

METHODS

There are two methods for the finding and the resection of the superior laryngeal nerve:

1. The nerve may be located where it emerges from the hyothyroid membrane. A skin incision is made parallel to the hyoid bone from the upper border of the thyroid cartilage to the sternocleidomastoid muscle, cutting through the fascia. The omohyoid and sternohyoid muscles are exposed and displaced toward the median line. The sternocleidomastoid muscle, with the large blood vessels, is pulled laterally. The nerve is then found on the hyothyroid membrane, running along with the superior laryngeal artery and vein.

2. A search is made for the superior thyroid artery. The superior laryngeal artery branches off from the latter, and the superior laryngeal nerve runs parallel with it.

I have used the first method in all my cases. I might say that the locating of the nerve, by following this method, is simple. Difficulties are encountered only in those cases in which the extension of the disease process into the surrounding tissues causes fibrosis and swelling. This condition I found in only one of my cases.

After the operation there is difficulty for a few days in swallowing, which then promptly subsides. Most of my patients considered the

operation a minor procedure, and without exception there was complete and permanent relief from pain on swallowing. Mayer [2] observed pain on swallowing in spite of successful severance of the nerve due, in his opinion, to the extension of the ulceration in such cases beyond the area of the superior laryngeal nerve. The operation can easily be performed under local anesthesia, and it is well borne except by patients in poor condition. In cases such as these I prefer to inject alcohol. The wound in all of my cases healed by primary union. I have dissected both nerves, when necessary, at an interval of one week. In several cases, after the operation a mild edema appeared on the diseased side of the larynx which, however, completely disappeared in a few days. Loss of the motor innervation of the cricothyroid muscle is not noticeable because resection affects only the inner branch and the cricothyroid muscle is supplied by the outer branch of the superior laryngeal nerve.

In one patient I observed the hypoglossal nerve in close juxtaposition to the superior laryngeal nerve. This explains the paralysis of the tongue (previously mentioned) after the injection of alcohol into the superior laryngeal nerve, the effect of the alcohol having extended to the two nerves. Shukoff [3] states that this anatomic condition is found particularly in short necked persons.

A number of authors assert that resection of the superior laryngeal nerve has a healing influence on the tuberculous process of the larynx. Mayer [2] observed the disappearance of acute inflammatory symptoms which were complicating the tuberculosis of the larynx. According to him, these acute inflammatory conditions are produced by the accumulation and stagnation of mucus and pus over the larynx and the pyriform sinus. Patients refrain from swallowing on account of pain, and irritation and inflammation ensue. At the same time, Mayer [2] did not notice a healing of ulcerations. Teller [4] records a definite recession of the edema in a series of cases following resection of the superior laryngeal nerve. Boncour [5] reports recession of the inflammatory conditions after blocking of the nerve by the injection of alcohol.

Kalina [6] believes that the resection of the superior laryngeal nerve has a direct healing influence on the inflammatory condition, and, conse-

---

2. Mayer, O.: Die Durchschneidung des Nervus laryngeus superior bei Schluckbeschwerden der Phthisiker **34**:1-2 (Jan. 6) 1921.

3. Shukoff, G.: Resection des nervus laryngeus superior bei Larynxtuberculose, Ztschr. f. Hals-, Nasen- u. Ohrenh. **4**:3-11, 1923.

4. Teller, W.: Neurotomie des Laryngeus superior bei fortgeschrittener Kehlkopftuberculose, Ztschr. f. Tuberk. **36**:35 (March) 1922.

5. Boncour, Paul: Traitement de la dysphagie dans la laryngite tuberculeuse par les injections d'alcool dans le nerf laryngé superieur, Progrès méd. **28**:251, 1912.

6. Kalina, O. G.: Zur Frage der Resection des Nervus laryngeus superior infolge einer Dysphagie, durch eine Tuberculose des Kehlkopfes veranlasst, Monatschr. f. Ohrenh. **60**:234 (March) 1926.

quently, on the tuberculous process in the larynx. He describes two cases in point. His opinion is based on the theory of Spiess,[7] according to which blocking of sensibility has a healing influence on the inflammatory condition. At the same time, Groll,[8] in a series of experimental investigations, proved that changes in the course of the inflammation after the severance of the nerve are not dependent on anesthesia. Therefore, the explanation of Kalina [6] with regard to tuberculosis of the larynx does not appear to be incontrovertible. On the other hand, Kalina [6] is wrong when he says that the superior laryngeal nerve is a sensory nerve only. It has long been known that this predominantly sensory nerve supplies motor fibers to the cricothyroid muscle, and, according to von Luschka, receives nerve fibers out of the superior cervical ganglion of the sympathetic nerve. Stupka [9] of Innsbruck recently made an exhaustive study of the composition of the laryngeal nerves. Literature on the influence of the blocking of the sympathetic nerve on tuberculous disease of the larynx is scarce.

Jacod [10] relates three cases of tuberculosis of the larynx in which he performed periarterial sympathectomy. In considering the question of the beneficial influence of resection of the superior laryngeal nerve, the elimination of the sympathetic fibers within the superior laryngeal nerve must be taken into consideration. To date this point has not been cleared up. My experience in this regard is as follows: In extensive destruction of the larynx by tuberculosis, I have not noticed any changes in the larynx following resection of the superior laryngeal nerve. In infiltrations with edema, in a few cases I observed a lessening of the edema. In only one of my cases, in which the condition was comparatively mild, did complete healing occur after resection of the superior laryngeal nerve.

CASE 2.—J., a woman, had progressive tuberculosis of the lungs. October 27, 1925, there was symmetrical general reddening of both vocal cords; the interarytenoid space was swollen and ulcerated. December 26, there was severe pain on swallowing, especially on the left side.

Jan. 4, 1926, resection of the left superior laryngeal nerve was performed. February 1, the larynx appeared normal. There was no ulceration or other evidence of tuberculosis. The reddening of the vocal cords had disappeared, and there was no pain on swallowing. The larynx remained normal until the death of the patient, March 2.

---

7. Spiess, G.: Die Bedeutung der Anaesthesie in der Entzündungstherapie und ihre Nutzanwendung speziell bei der Behandlung der Kehlkopftuberculose, Arch. f. Laryngol. **21**:120, 1909.

8. Groll, H.: Die Entzündung in ihren Beziehungen zum nervösen Apparat, Beitr. z. path. Anat. u. z. allg. Pathol. **70**:20, 1922.

9. Stupka, W.: Zur Histologie der Kehlkopfnerven, Ztschr. f. Hals-, Nasen- u. Ohrenh. **12**:228, 1925.

10. Jacod, Maurice: Trois observations de sympathicectomie périartérielle pour ulcerations torpides du larynx: Résultats immediats et éloignés, Ann. d. mal. de l'oreille, du larynx **44**:1217, 1925.

As one case did not seem to be sufficient to prove that blocking of the superior laryngeal nerve has a favorable influence on the course of tuberculosis of the larynx, I proceeded to resect the superior laryngeal nerve for therapeutic purposes in two other patients suffering from tuberculosis of the larynx who did not have dysphagia. The first patient had a deep ulceration of the right vocal cord. On March 10, 1926, I resected the nerve. About the middle of April, the ulceration showed a decided tendency to heal. May 4, the ulceration seemed covered over and superficial.

In the treatment of tuberculosis of the joint, immobilization is band which healed three weeks after the resection of the superior laryngeal nerve. Later, however, a large new infiltration formed in the ventricle of Morgagni on the same side.

In conclusion, I would say that because of the simplicity of the operation and the certainty of permanent relief, resection of the superior laryngeal nerve for dysphagia in tuberculosis of the larynx may be preferred to the injection of alcohol, which is uncertain in its results. However, it cannot be stated that it has a direct, favorable effect on the healing of the tuberculous process.

INFERIOR LARYNGEAL (RECURRENT) NERVE

In the treatment of tuberculosis of the joint, immobilization is attempted in order to effect a cure. In a one-sided tuberculosis of the lungs, artificial pneumothorax is resorted to in order to put the diseased lung at rest. The same principle may be applied to tuberculosis of the larynx. I shall describe a method whereby it is possible, particularly in a one-sided tuberculosis of the larynx, to put the affected side at rest.

For a long time two methods for the immobilization of the larynx have been in vogue, silence treatment and tracheotomy. Both of these methods particularly eliminate phonation. The first method cannot be carried out readily for any length of time. The second method requires too serious an operation for the tuberculous patient. As far as tracheotomy is concerned, my experience is similar to that of most authors, and in my opinion this operation should be performed only when absolutely necessary, that is, in cases of a high grade stenosis. The danger of infection of the wound, through expectoration from the lungs, with its disagreeable symptoms, is always present except in cases in which expectoration is slight or absent.

Complete immobilization of the larynx may be secured by a much simpler method—by paralyzing the motor nerve of the larynx, the inferior laryngeal (recurrent) nerve. This is a comparatively new method of treatment, which was first used by Leichsenring [11] and von der Huetten [12] in a number of cases. Literature concerning it is

scarce. In France, this method was used in one case and described by Moulonguet.[13] As stated in the foregoing, it is particularly intended for a one-sided condition.

Von der Huetten [12] exposes the recurrent nerve on the affected side by operation, freezes and paralyzes it with ethyl chloride. He prefers this method because he believes he can thereby insure the recurrence of conductivity. He showed by his experiments that the duration of the paralysis depends on the length of time the nerve is exposed to freezing. His method of operation resembles the one used in thyroid operations; namely, at its lower pole the thyroid gland is liberated and turned upward, and the nerve is sought. Von der Huetten [12] does not consider this a serious operation for tuberculous patients. I had Dr. Louis Sachs of Sea View Hospital perform this operation on one of my patients. Instead of freezing the nerve, he cut it through. The result was unsatisfactory, and I am convinced that although the operation can be performed quickly and skilfully, it constitutes a serious attack on the patient, and I decided not to repeat it on other patients.

Coincidentally with von der Huetten's [12] work, Leichsenring [11] introduced a bloodless method consisting of paralysis of the recurrent nerve by the injection of alcohol. I believe this method is preferable to the operation, because of its simplicity and harmlessness. I used it on twenty-one patients with tuberculosis of the larynx without observing any complications, such as necrosis in the vicinity of the trachea, which I at first feared. The technic of the work is simple. A needle from 6 to 8 cm. in length is pushed along the first tracheal ring to the vertebral column, then withdrawn about 1 to 1.5 cm.; then from 1 to 1.5 cc. of an 80 per cent alcohol solution is injected. After the injection, some patients complain of pain in the shoulder; this, however, disappears in a few days. The paralysis remains on an average from about four to eight weeks, when mobility of the vocal cord returns. In my series of cases, in one case the paralysis persisted after five months, although phonation was perfectly clear.

---

11. Leichsenring, E.: Behandlung der Kehlkopftuberculose mit Recurrenslähmung, Klin. Wchnschr. **2**:498 (March) 1923; Kurative Recurrenslähmung bei Kehlkopftuberculose durch perineurale Injection und deren Eignung zur Nachprüfung des Rosenbach—Semon' schen Gesetzes, Ztschr. f. Hals-, Nasen- u. Ohrenh. **5**:68, 1923; Weitere Erfahrungen mit der Kurativen Recurrenslähmung, ibid. **10**:287, 1924. Leichsenring, E., and Hegener, Julius: Kurative Recurrenslähmung und das Rosenbach—Semon'sche Gesetz, ibid. **7**:284, 1923-1924.

12. Von der Huetten: Vereisung des Nervus recurrens bei Kehlkopftuberculose, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:284, 1924; Zur Behandlung der Larynx-tuberculose durch temporäre Ausschaltung des recurrens vermittels Vereisung, ibid. **7**:64, 1923-1924.

13. Moulonguet, A.: Traitement de la tuberculose laryngée par la section du nerf récurrent, Ann. d. mal. de l'oreille, du larynx **43**:608, 1924.

One might assume that this therapeutic paralysis of the inferior laryngeal nerve might be used in bilateral conditions on both sides. However, in one case I have noted a median position of the paralyzed vocal cord after the paralysis, a fact which is also especially emphasized by von der Huetten [12] in his article; consequently, to safeguard against laryngeal occlusion one should be careful not to paralyze both recurrent nerves simultaneously. The objection that immobilization of one vocal cord exposes the other one more to tuberculous disease on account of the increased function can so far hardly be upheld. Among the cases described, one (case 8) showed tuberculous disease on the right side two months after the paralysis of the left side. However, this patient might possibly have developed this right-sided disease even if I had not paralyzed the left side. It is difficult to pass judgment on this point.

As a further objection to this method, it is asserted that the cough mechanism is disturbed, and that expectoration is made more difficult. When questioned on this point, all of my patients said that expectoration was just as easy after the paralysis as before. At any rate, the great advantage of this method lies in the fact that there is no shock and exhaustion; the method is harmless and can be repeated, if necessary.

By injection of the recurrent nerve the cricothyroid muscle, which stretches the vocal cord and gets its innervation from the external branch of the superior laryngeal nerve, is not paralyzed. This is hardly required and, perhaps, not even advantageous, because by the paralysis of this muscle at times the glottis assumes an oblique position. If, however, an absolute relaxation of the vocal cord is desired, I advise paralyzing the external branch of the superior laryngeal nerve according to the following method: The needle is introduced against the plate of the thyroid cartilage, near the lower and posterior border, and the lower and posterior one third of the thyroid cartilage is injected, with the needle resting against the cartilage at all times.

The following is a more detailed report of my cases:

Case 3.—A., aged 41, had advanced tuberculosis of the lungs, in which there were cavities. At the time of admission to the hospital, the left vocal cord was swollen and red.

Jan. 29, 1926, therapeutic paralysis of the left recurrent nerve was performed. March 7, the swelling and redness of the left vocal cord had disappeared. The paralysis persisted until the death of the patient, May 16.

Case 4.—S., aged 34, had fibro-infiltration of the lungs. The left ventricular band of the larynx was swollen and ulcerated.

Feb. 3, 1926, therapeutic paralysis of the left recurrent nerve was performed. April 22, there was slight improvement. The swelling of the ventricular band was receding, and the ulceration was superficial.

June 15, the paralysis was still present, but the ulceration was no longer visible. Direct inspection by a Jackson laryngoscope showed a slight depression of the left ventricular band (scar), but no ulceration.

CASE 5.—P., aged 42, had a fibrotic condition in the lungs. There were infiltration and ulceration of the right vocal cord and swelling of the interarytenoid space. The left vocal cord was moderately reddened. The condition remained stationary for from five to six months.

Feb. 7, 1926, therapeutic paralysis of the right recurrent nerve was performed. April 6, return of motility of the right vocal cord was noticed for the first time; it still was slightly reddened, but the swelling and ulceration had disappeared. The swelling of the right side of the interarytenoid space was considerably reduced.

On the theory that a paralysis of the left side might exert a favorable influence on the swelling of the left half of the interarytenoid space, the left recurrent nerve was also paralyzed. June 30, the paralysis of the left vocal cord still persisted. The swelling of the left side of the interarytenoid space was somewhat less.

CASE 6.—C., aged 23, had a fibrotic condition in the lungs. Feb. 17, 1926, there was swelling of the left vocal process of the arytenoid cartilage and of the left side of the interarytenoid space. Hoarseness was noted. March 18, therapeutic paralysis of the left recurrent nerve was performed. April 18, the swelling of the vocal process and the arytenoid cartilage had disappeared. A comparatively slight swelling of the interarytenoid space persisted.

April 25, the motility of the left vocal cord returned; the voice was quite clear. May 26, as the swelling in the interarytenoid space had not entirely disappeared, it was decided again to paralyze the left recurrent nerve.

CASE 7.—B., aged 32, had a fibrotic process in the lungs. Feb. 2, 1926, both vocal cords were swollen and reddened. The left was more irregular, presenting on the surface small nodules and superficial ulcerations. The patient was hoarse.

February 5, therapeutic paralysis of the left recurrent nerve was performed; April 1, motility of the left vocal cord returned. The surface was almost entirely smooth. The redness had almost completely disappeared. The voice was clear.

CASE 8.—O., aged 21, had a fibrotic process in the lungs. The left vocal cord, especially its posterior portion, as well as the left subglottic region, was reddened and markedly swollen.

April 27, therapeutic paralysis of the left recurrent nerve was performed. July 1, the swelling of the left vocal cord and the subglottic region showed hardly any change, but redness, swelling and ulceration of the anterior part of the right vocal cord were noticed.

CASE 9.—C., aged 49, had a fibrotic process in the lungs.

The patient, whose left recurrent nerve was paralyzed on account of the condition of the left vocal cord, left the hospital nineteen days later, unimproved. The paralysis still existed at the time of his discharge.

CASE 10.—S., aged 45, had a fibrotic process in the lungs. Both vocal cords were swollen and ulcerated. The tissues in the interarytenoid space were swollen.

Feb. 8, 1926, alcohol was injected in the left recurrent nerve, without effect. February 22, the injection was repeated with success.

April 6, the condition in the lung grew definitely worse. The right vocal cord and the ventricular band were extensively ulcerated. The left ventricular band was swollen and overlapped the left vocal cord.

June 5, the patient left the hospital unimproved.

CASE 11.—R., aged 32, had a fibrotic process in the lungs. The right vocal cord was swollen and ulcerated, especially at its posterior end.

May 11, therapeutic paralysis of the right recurrent nerve was performed.

July 1, the swelling and ulceration of the right vocal cord had disappeared; slight reddening was still present. The paralysis continued.

CASE 12.—M., aged 42, had a fibrotic process in the lungs. The left ventricular band was swollen and overlapped the left vocal cord.

Feb. 15, 1926, therapeutic paralysis of the left recurrent nerve was performed. March 8, the left vocal cord had regained its motility. There was no improvement of the larynx. Later, the condition of the lungs and larynx became so definitely worse that further treatment was abandoned.

CASE 13.—G., aged 22, had a fibrotic process in the lungs. Feb. 13, 1926, there was infiltration of the tissues of the interarytenoid space, especially on the left side.

February 24, therapeutic paralysis of the left recurrent nerve was performed.

May 20, the paralysis of the left vocal cord persisted. The swelling of the interarytenoid space had disappeared. May 22, the patient was discharged from the hospital.

CASE 14.—R., aged 38, had a fibrotic process in the lungs and a tuberculous ischiorectal abscess.

February 4, both vocal cords were slightly reddened. The left one was much swollen in its middle and posterior portions. There was decided hoarseness. Injection of alcohol into the left recurrent nerve was performed.

April 6, the left vocal cord had regained its motility, only a slight thickening at its posterior end remaining. The hoarseness was much diminished.

CASE 15.—P., aged 39, had a fibrocaseous process, with cavitation, in the lungs. There was decided swelling, redness and ulceration of the left vocal cord, which was given three treatments by electrocautery, with no effect.

Feb. 8, 1926, therapeutic paralysis of the left recurrent nerve was performed. April 1, the motility of the vocal cord again was normal. The ulceration had disappeared. Some redness and swelling still persisted. After a while the condition in the lung became definitely worse. Swelling and redness of the right vocal cord developed. The patient refused further treatment of the larynx.

CASE 16.—D., aged 32, had advanced tuberculosis of the lungs, in which there were cavities. Feb. 9, 1926, both vocal cords were ulcerated, the left more extensively than the right.

February 10, therapeutic paralysis of the left recurrent nerve was performed.

April 9, no improvement in the condition of the larynx was noted. July 5, the patient died.

CASE 17.—P., aged 24, had a fibrotic process in the lungs. Examination of the larynx, Oct. 12, 1925, showed infiltration and ulceration of the tissues in the interarytenoid space.

Jan. 25, 1926, it was noted that the right vocal cord had been reddened and swollen for a week. May 18, the infiltration of the tissues in the interarytenoid space had become extensive and tumor-like. The left vocal cord had also become slightly reddened.

May 26, therapeutic paralysis of the right recurrent nerve was performed.

July 1, there was no improvement in the condition of the larynx.

In addition to the patients referred to in the foregoing, there were six other patients (cases 18 to 23, inclusive) under treatment, in three of whom it was impossible to produce paralysis, even after repeated injections. The other three declined further treatment after the failure of the first injection. Of course, there are some cases in which injections must be repeated before paralysis can be produced.

COMMENT

Results in fifteen cases of therapeutic paralysis of the recurrent nerve may be summarized: (*a*) improved, nine cases (cases 3, 4, 5, 6, 7, 11,

13, 14 and 15); (*b*) unimproved, three cases (cases 8, 16 and 17); (*c*) worse, two cases (cases 10 and 12), and (*d*) insufficient treatment and observation, one case (case 9).

I have tabulated apparently healed cases as improved, as a complete anatomic healing appeared doubtful to me after so short a period of observation.

At all events, this method of treatment, which has been in use for only the last few years, appears destined to play an important rôle in the treatment of tuberculosis of the larynx as an adjunct to the other methods of treatment. Laryngologists who prefer more conservative methods of treatment are likely to use this method, as are those who may have justifiable doubts as to the efficacy of operative intervention, such as curettage and cauterization, which may be useful in certain cases and harmful in others. Of course, in the treatment of tuberculosis of the larynx, each patient should be studied conscientiously from certain points of view and the best method of treatment determined.

As the cases described in the foregoing show, the therapeutic paralysis of the recurrent nerve is especially beneficial in unilateral cases which have not advanced too far and in which the pulmonary condition is relatively favorable, i. e., in the fibrotic forms.

NONENDOSCOPIC CASES OF FOREIGN BODIES IN THE TONSIL*

LOUIS H. CLERF, M.D.
PHILADELPHIA

Every rhinolaryngologist has been consulted by patients who, while eating, have had something lodge in the throat, which they could feel sticking them. The question arises, What shall be done by the physician who does not care to employ endoscopic procedures?

Among the many foreign bodies found in the faucial and lingual tonsils and in the lymphoid tissues of the pharynx, fish bones are more common than all the other forms combined. Other substances, such as toothbrush bristles, toothpicks or slivers of wood, spicules of some of the long bones, plant stems and occasionally some form of metallic foreign bodies, are found. These foreign bodies are introduced through the mouth, in contradistinction to the tonsillolith or calculus of the tonsil, which originates from within the tonsillar crypt, but which may give rise to symptoms suggesting the lodgment of a foreign body.

ETIOLOGY

As all of these substances are introduced from without, and a majority of them are carried into the mouth with foods, it is safe to assume that carelessness in the preparation and in the eating of food is the most important factor in their occurrence. Chevalier Jackson [1] states that carelessness is the most frequent cause of foreign bodies in the air and food passages (87.2 per cent). This was exemplified in the case of a child, aged 13 months, who began to choke and gag after having been given a portion of fish to eat. A long fish bone was removed from the right tonsil.

It is a well-known fact that during the mastication of food, fish bones and other inedible substances are usually detected by the sensitive mucosa of the tongue and floor of the mouth, cheeks, alveolar processes and the hard palate, and may then be removed from the mouth. Persons wearing complete dentures and those in whom the sensibility of the mucous membrane of the structures of the mouth is decreased are deprived of this protective mechanism, and consequently are often afflicted with foreign bodies in the upper food passages as well as in

---

* From the Chevalier Jackson Bronchoscopic Clinic.
* Read before the College of Physicians of Philadelphia, Section on Otology and Laryngology.

1. Jackson, Chevalier: Foreign Bodies in the Larynx, Trachea, Bronchi and Esophagus Etiologically Considered, Tr. Sect. Laryng., Otol. & Rhin., A. M. A., 1917, p. 36.

the esophagus. Hurried eating with bolting of food is a predisposing factor. The large tonsil, which projects well beyond the anterior pillar and possesses many large crypts, is peculiarly susceptible to foreign body lodgment.

To effect lodgment of a fish bone or other pointed substance in the tonsil, there must be an additional factor which will force the pointed object into a tonsillar crypt or through the mucous membrane. This is supplied by deglutition, that extremely complex act, which forces the bolus of food into the esophagus and onward. During the first stage of swallowing, the tongue, arching from before backward against the roof of the mouth, forcibly propels the bolus of food through the faucial isthmus toward the pharynx. Simultaneously the larynx with the superimposed epiglottis is elevated and, through the action of the latter, the bolus either is deviated to one or the other side or is divided before entering the pyriform sinus. From this it can be seen that any foreign substance contained in the swallowed food comes in intimate contact with the base of the large faucial as well as with the lingual tonsil.

SYMPTOMS

There is a sharp sticking pain or a pricking sensation constantly present, which usually is aggravated by swallowing saliva and often greatly intensified by swallowing food. The painful point is usually localized to the side involved, which corresponds to a point below the angle of the lower jaw if the faucial tonsil is involved, or to a point about the hyoid bone and near the midline if the foreign body is in the lingual tonsil. The power of localization about the tonsil region is poor; however, it is useful in determining the side affected. If the foreign body is long enough for its free extremity to come in contact with the epiglottis, the pharyngeal wall or the opposite tonsil, there may be gagging, retching or coughing, and localization will be exceedingly difficult and indefinite.

DIAGNOSIS

Although an inferential diagnosis might be made on the history and the symptoms elicited from the patient, too often the foreign body cannot be found. Instead there will be seen acute tonsillitis, chronic tonsillitis with crypts filled to bulging with caseous particles, or injury of the throat inflicted by the patient while trying to dislodge a foreign body believed to be present.

A positive opinion can be given only after a systematic search of the throat has been made. This must be carried out by inspection, for which good illumination is imperative. The search should be made slowly and deliberately, so that every crypt and inequality of the surfaces of the lymphoid structures can be carefully observed. With the tongue

depressed, the visible portion of the faucial tonsils, the base of the tongue and the pharyngeal wall should be inspected. The anterior faucial pillars should be drawn forward with some form of pillar retractor which does not obscure the view. The angular pillar retractor devised by Chevalier Jackson is useful for this purpose. Gagging of the patient should be avoided; however, there are times when this reflex, which produces a certain degree of eversion of the tonsil, will cause the free end of a small fish bone or toothbrush bristle to present itself momentarily at the mouth of a tonsillar crypt in which it has completely buried itself. The posterior surface of the tonsil, the posterior surfaces of the anterior and posterior faucial pillars, the region of the lingual tonsil and the vallecula should now be carefully inspected. If no foreign body can be discovered, palpation should be resorted to, since by this method an embedded foreign body can often be detected when the free extremity does not project sufficiently beyond the surface of the tonsil to be observed with the unaided eye. In this connection may be cited the case of Chevalier Jackson (personal communication) who, when an undergraduate student of medicine at the Jefferson Medical College, about forty years ago, felt something lodge somewhere in his throat while eating a portion of reed bird. The following day he consulted Dr. C. E. de M. Sajous, who found no foreign body on direct inspection of the tonsils. Dr. Sajous then palpated back of the tonsil with the index finger and found a small spicule of reed bird bone sticking in the posterior surface of a greatly hypertrophied tonsil. The bone was removed, and the symptoms were immediately relieved. If the object is completely embedded, gentle pressure made over the tonsil pressing it into the fossa will often elicit or intensify the sticking sensation.

Gleason recommends using a cotton tipped applicator to assist in detecting small spicules of foreign body which might be embedded in the tonsil substance. The cotton tipped extremity of the applicator, being gently stroked over the tonsillar surface, will entangle itself with any projecting point of a foreign body, thus indicating its position.

It is important to recall that patients will often continue to experience the sensation of pain or pricking for a considerable time after the foreign body is removed; so that in the absence of positive evidence, either the persisting sensations may be attributed to a foreign body which has passed on spontaneously after temporary lodgment, or the symptoms may be the result of self-inflicted injury.

There is a belief current among the laity that a roentgen-ray study should be made in these conditions. This would be extremely valuable in the case of an opaque foreign body, but would give no information if the foreign body was nonopaque to the roentgen ray; neither would the employment of a bismuth mixture or a bismuth filled capsule give any positive data, and a negative roentgenologic opinion could not exclude

a foreign body. Roentgenology is invaluable if the foreign body is in the esophagus, and should always be resorted to if the symptoms are referable to the esophagus or hypopharynx.

TREATMENT

This consists primarily of removal of the foreign body if present. Should these patients be sent to the endoscopist? Not necessarily, since the problems involved in the diagnosis as well as in the treatment are those employed daily by every rhinolaryngologist. When found, the foreign body can be readily grasped with an ordinary forceps, and removed. Following the removal, an application of mild silver protein, silver nitrate, tincture of iodine or other medicament may be made to the point of lodgment. If no foreign body can be found after several careful examinations and the symptoms, which persist over a considerable time, can be definitely localized to the tonsil, it may be necessary to perform tonsillectomy, the assumption being that the foreign body is completely embedded in the tonsil substance, and can be removed only by incision into the tonsil, or preferably by its removal.

CONTRACTURED ULNAR PARALYSIS

RELIEVED BY TREATMENT OF THE NASAL (SPHENOPALATINE) GANGLION

W. R. BRANDON, M.D.
NEW YORK

Recently, a number of cases have been reported in which unexpected or strange, even bizarre, effects have been produced by cocainization and treatment of the nasal (sphenopalatine) ganglion. The following case is of interest:

CASE REPORT

History.—L. B. R., a farmer, aged 23, called me on Oct. 5, 1922, at which time he was confined to bed; his chief complaint was severe pain in the left side of his head, radiating down the left shoulder and left arm to the hand ("lower half headache"). The patient was a well developed and well nourished young man, whose history, with the exception of appendectomy in 1918 and influenza in the fall of 1918, was negative. There was also a history of some sinus trouble, following influenza, which had run its course without treatment. On May 1, the patient first began to have pains in the left side of his face, extending practically all over the left side of the head. Almost immediately, this was followed by severe pains in the neck, extending through the left shoulder, down the left arm and hand, causing a contraction of the ring and little fingers. This contraction had been persistent since the onset, and severe enough to cause excoriation in the palm of the hand. There was a history of a frequent unilateral headache and attacks of pain down the left arm and hand; also some complaint of pain in the left leg at times. The slightest effort to extend the affected fingers produced excruciating pain. The examination of the nose showed a badly deformed septum, and the mucous membrane throughout showed a marked hyperplastic thickening. In gross examination, no pus was seen. The temperature was normal.

Treatment and Course.—Because of the recognition of the "lower half headache," the nasal ganglion area was treated by applying 20 per cent cocaine on cotton which was large enough to extend well over the area. This was allowed to stay in place twenty minutes, and was followed almost immediately by some relief of the severe pain in the head, for which I was called to see him.

On October 7 I saw the patient in my office, and while he was relieved from the acute pain, he was still suffering from the same complaint. The nasal ganglion was treated again with 20 per cent cocaine for thirty minutes; this was followed by an application of 2 per cent silver nitrate. This treatment was continued daily for two weeks, then every second or third day for about three weeks. During the first week the antrums were punctured for evidence of retention. The washing was negative. During this time the patient continued to improve and was free from any acute attacks.

On account of almost complete nasal obstruction on both sides, I performed a submucous resection of the septum and continued to treat the nasal ganglion area, increasing the strength of the silver nitrate to 5 per cent. This was done about twice a week for almost three weeks following the operation. The patient continued to improve, having had no more acute attacks, and the contracted condition of the fingers gradually showed some improvement. At the end of three months from the beginning of treatment, there was enough relaxation to allow the fingers to extend almost 1 cm. from the ulcerated surface of

the hand in which they had been clinched, and the ulcerations had healed. Two months later the patient had continued to improve, and was still free from painful attacks; he was able to extend the fingers to about half the normal extension. This condition continued to improve, and all the symptoms cleared up. In December, 1923, when I was last in touch with the patient, he was working in a hardware store and had had no further trouble.

A letter from the patient dated April 1, 1926, follows:

"My hand is as strong as it ever was. My two fingers that were stiff when you performed the operation are straight now. They are not the least bit numb. My whole left side is normal. You remember that it was numb from my head to the tip of my toes when you began to treat me. My left arm is good and strong, too. In every way your treatment has proved a success."

THE THYMUS GLAND*

W. WALTER WASSON, M.D.
DENVER

In a previous paper,[1] I have communicated certain observations with regard to the thymus gland. At this time I wish to report further and more detailed observations on this gland. This report covers a careful study of 135 children under 2 years of age. Thirteen of these children have been studied by serial roentgenograms and serial physical examinations from birth to the age of 3 years, in order that we might have some conception as to what happened to the thymus the year following the 2 year period. The medical literature is rich in studies and investigations of the thymus gland, dating back to the time of Galen, and I can do no better than to refer the reader to Crotti's summaries as found in his text, "Thyroid and Thymus."

The thymus gland is situated in the upper mediastinum, overlapping the great vessels and the base of the heart. Before one can study roentgenograms of this region, it is necessary to have a clear knowledge of the anatomy and of the nature and characteristics of the shadows that this anatomy would cast on the roentgenogram. To gain this knowledge and to be able to identify any of the structures of the mediastinum on the roentgenogram, I adopted the following plan:

METHOD OF OBSERVATION

1. Whenever possible, roentgenograms are made of the chest just before death and immediately afterward on the same body.

2. After an incision is made in the neck and the trachea is opened, the lungs are carefully inflated to their normal capacity and roentgenograms are made. The bronchial tree is injected through this tracheal incision, the lung pressure being maintained at the same time, and roentgenograms are made (fig. 1, *a*).

3. The chest is now opened by the usual method of removing the sternum and manubrium; the arteries are injected and roentgenograms are made; then the veins are injected and roentgenograms are made, the intrapulmonary pressure being maintained at the same time and the sternum and manubrium being stitched into position before each roentgenogram is made.

4. Small threads of copper wire are placed around the thymus and roentgenograms are made, still maintaining the intrapulmonary pressure; the heart is similarly outlined and a roentgenogram made (fig. 1, *b, c*).

5. The reflections of the mediastinal pleura are outlined with small strips of leadfoil, and roentgenograms made; roentgenograms are also made following injection of the pulmonary arteries, the veins and the aorta (fig. 1, *d, e, f*).

---

* This work is being accomplished through the aid of the Selmene Winter Foundation.

* Figures 1, 3 and 9 in this article are reproduced through the courtesy of Radiology.

1. Wasson, W. W.: Radiography of the Infant Chest with Special Reference to the "Progression of the Chest and the Determination of the Normal," Radiol. **5**:365 (Nov.) 1925.

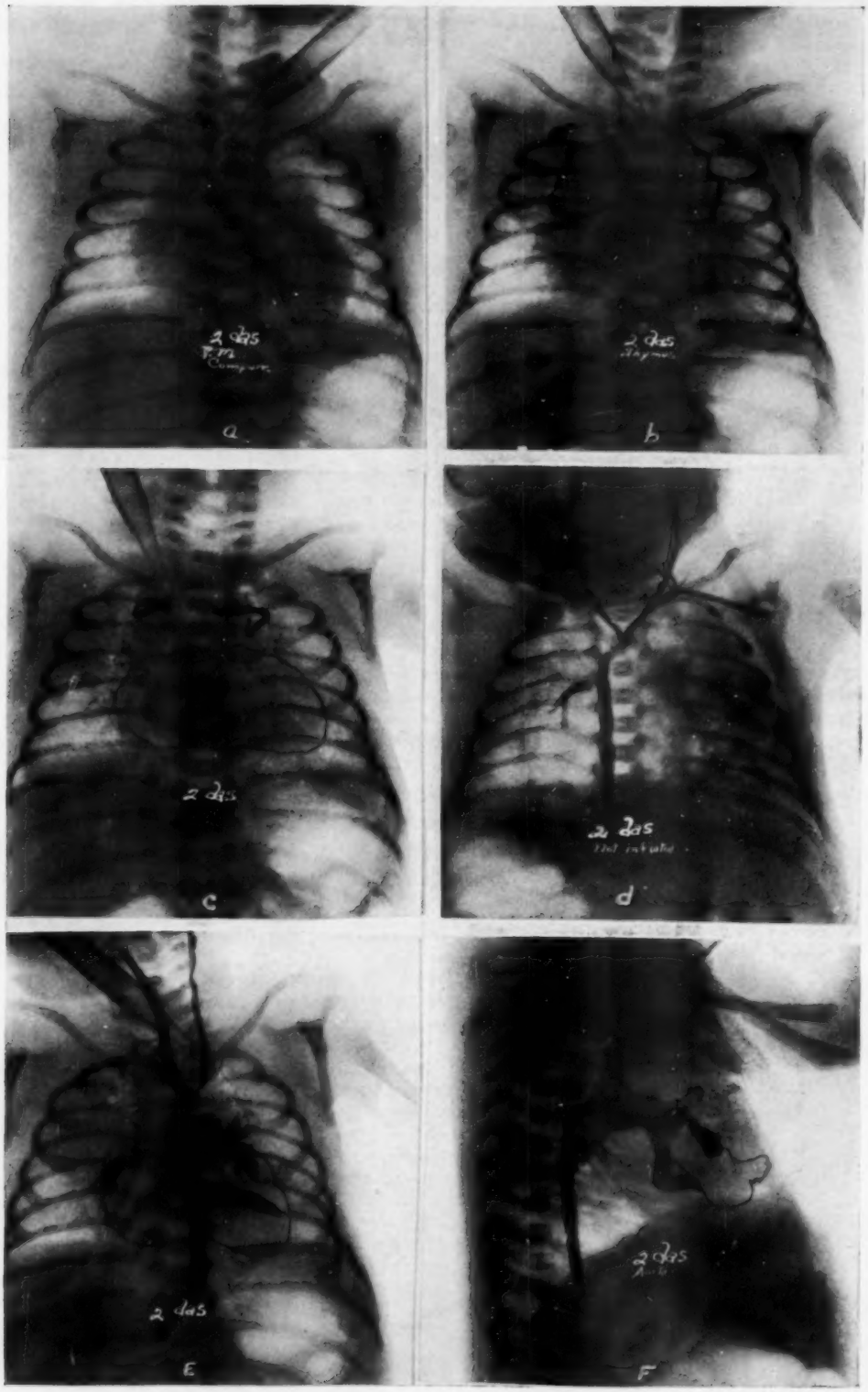


Fig. 1.—Necropsy performed on an infant, aged 2 days, for identifying the mediastinal shadows; (*a*) inflation of lungs through cannula in the trachea. This inflation is maintained throughout except in *d*; (*b*) leadfoil about thymus; (*c*) fine copper wire about thymus and heart and leadfoil along mediastinal pleural reflection over the thymus; (*d*) arteries of the left lung injected, but intrathoracic pressure released; (*e*) aorta and pulmonary artery injected, showing pulmonary artery lying to the left; (*f*) lateral view of *e*, showing aorta passing directly backward from the heart.

6. Necropsy is then performed, the thoracic viscera being studied carefully and the observations correlated with those on the roentgenogram. This is done not only by visual demonstration, but also by careful measurements of the structures as found at necropsy and as seen on the roentgenogram.

These studies were carried out on stillborn infants, on infants a few hours old and on infants ranging from a few months to 4 years of age.

OBSERVATIONS ON ANATOMY

From these necropsy studies, I arrived at the following conclusions:

At birth, the shadow usually attributed to the heart is that of the heart; the right border of the heart is formed by the superior and inferior venae cavae; the right ventricle lies to the left of the right border of the heart and the right auricle above and to the left. The left border of the heart is formed by the left ventricle. The two auricles and the great vessels form the base of the heart shadow. The superior vena cava forms the right border of the great vessels' shadow as they come off from the heart, and the pulmonary artery the left border. The pulmonary artery quickly divides into the right and left pulmonary arteries, and in a number of the cases there was a patent ductus arteriosis. The aorta lies in the middle of the mediastinum, and in the new-born infant is not seen as a distinct shadow because of its position. It passes directly up, turns directly backward and passes down behind the heart. It is only in later life that it forms the typical aortic arch as seen in adults. The comparative size of the aorta and pulmonary artery is nearly the same at birth. If then there is no sizable thymus present, these great vessels, venae cavae, aorta and pulmonary artery, form a shadow, triangular in shape, which quickly narrows as it passes upward toward the first rib, and at its narrowest point is less than the transverse diameter of the shadow of the spinal column. The trachea with its air column will be observed to pass down in midline behind the aorta and bifurcate at about the third thoracic vertebra into the right and left main bronchi. The esophagus, of course, lies behind the trachea but is not usually discernible. If the thymus is present in any considerable size, it will be found to overlap the base of the heart and to pass upward, obscuring the shadow, just described, of the great vessels. The shadow of this thymus is again triangular in shape, with its base overlapping the base of the heart and especially the auricles. Once having fixed firmly in one's mind the shadow cast by the base of the heart and great vessels, and how the shadow of the great vessels rapidly narrows toward the first rib, one should readily discern the shadow of the thymus. Its transverse diameter at its broadest point, which is usually the third interspace, may be two or three times the diameter of the shadow cast by the thoracic spine. This shadow of the thoracic

spine is taken by measuring the transverse diameter of the vertebral bodies. If the shadow of the thymus is no greater than that cast by the great vessels, it is a small thymus. The thymus lies anteriorly against the upper sternum and manubrium, and posteriorly on the auricles, great vessels and trachea. Laterally, it is overlapped by the anterior margin of the lungs and when fairly large pushes the lung to either side. Thus it will be noted that the thymus lies between a bony structure anteriorly and the bony spinal column posteriorly, with the great vessels and trachea between the thymus and this poterior spine, and that only laterally and downward has it any chance to spread during its growth. It does so by pushing the anterior margin of the lung laterally, and as these lateral lobes of the thymus are surrounded by the lung they are readily shown on the roentgenogram. Some writers have described a large thymus which is large only in its anteroposterior diameter, but I have never seen such a one and cannot conceive of such a thymus except under unusual conditions. The thymus is a soft, almost jelly-like gland, and when removed and placed in the hand it has a tendency to flatten out; when in situ it is not held by any definite firm tissue but has only the thin mediastinal pleura on each side, the firm bone structures in front and above and the great vessels and spine posteriorly. It must, therefore, grow laterally and downward over the heart. On inflation of the lungs, I found it easy, by increasing the pressure gradually, to squeeze the thymus until the shadow was hardly perceptible in the posteroanterior position. This, of course, was due to the direct pressure exerted by the anterior margins of the lung on the lateral lobes of the thymus. This phenomenon, and the possibility of pressure in turn on the trachea or the other mediastinal structures, will require further study. At least this tends to favor the belief that the thymus roentgenograms, both at inspiration and at expiration, should be taken in the recumbent position. Lying in the mediastinum, its lateral lobes will have a reflection of the pleura. The anteroposterior diameter of the thymus is that of the distance between the tracheal shadow and that of the manubrium and sternum. The parietal pleura is reflected from the midline of the sternum on the right and 0.5 cm. from the midline on the left to surround the thymus and great vessels and to pass back to the spinal column, forming the lateral borders of the mediastinum. Its shadow, of course, blends in with the mediastinum and is not discernible.

It is necessary that roentgenologists have a clear conception of this information concerning the anatomy of the mediastinum. There is considerable variation from birth to 3 or 4 years of age. I have observed some writers describing the superior vena cava and its curve at the point of entering the right auricle as the right lobe of the thymus, or a prominent pulmonary artery as the left lobe of the thymus. These

errors are usually made in children over 2 years of age. The right auricle may be quite large at birth and somewhat confusing, but it should be remembered that it is situated rather low for the thymus gland. Enlarged mediastinal glands should be recognized either by the character of their shadows or by the associated pathologic change at the hilum of either lung.

The next problem is the technic that will portray correctly the thymus gland and its surrounding anatomy on the roentgenographic film. One of the essential points is an exposure sufficiently rapid to stop both the voluntary motion of an infant and the involuntary motion as conveyed to the mediastinum by the action of the heart and its great vessels. Such an exposure I have computed as one-twentieth of a second; I have found it practical over a period of years and have reported this technic in detail. It is also necessary that the films show the soft tissue detail, both of the mediastinum and of the chest in general. The position of the infant or child is a much debated point, as is the question whether the roentgenogram should be taken at expiration or inspiration. It is likely that one could utilize any one of these methods in a routine manner. Certainly there is considerable variation in the same patient between the various positions. The breadth of the mediastinum may be entirely different in the same infant when taken at expiration or at inspiration, in a recumbent position or in the upright position. It is therefore best and necessary that the roentgenologist select a method meeting his requirements and then make all roentgenograms under these conditions so that his comparisons and deductions will be uniform. I have selected the posteroanterior position in the recumbent position at full inspiration. I insist that these positions be exact, with no oblique views unless for special conditions. The diaphragm must curve downward from well beneath the heart, and its crest should maintain a uniform level on the thoracic spine, which is usually about the eighth vertebra and is quite uniform in a series of roentgenograms of the same child. Under these conditions, the mediastinal viscera occupy the mediastinal spaces with ease, and neither produce unnatural bulging of the thymus or create a space into which the thymus may fall. In other words, the mediastinal shadow under these conditions is about one and one-third times the bodies of the thoracic vertebra, unless it is increased by the thymus or by some pathologic condition, when measured at the level of the second interspace.

The question must then be answered, "Does this technic fully portray the thymus gland?" It has been stated by many authors that the roentgenogram is not accurate and seldom gives information in regard to this gland, but this has not been my experience. I have had the opportunity to examine infants and children from birth to a few years of age, both before and after death, with the roentgen ray and checked at necropsy,

and have found the anatomy as portrayed by the roentgenogram to be surprisingly accurate. This accuracy is dependent on the thymus gland broadening the mediastinal shadow or distorting it at any point, which is nearly always the case if the thymus is of an appreciable size. It also follows that in a small thymus there will be no apparent change in the mediastinal shadow. The thymus cannot grow anteriorly or posteriorly except under unusual conditions, and therefore must push the lung to either side or be molded downward over the heart. Perkins reports the case of a thymus molded over the base of the heart so that its shadow could not be detected, and Crotti reports one which surrounded the heart. Noback has found several cases with prolongations posteriorly between the thoracic viscera. The thymus may also be found high at the base of the neck, but it is my opinion that all these conditions must be considered as unusual, at least in patients under 2 years of age.

If, therefore, the roentgenogram may be considered to portray accurately the size and position of the thymus gland except in rather rare and unusual cases, it follows that there is a means for observing this gland, not only as to its pathologic condition, but perhaps as to its physiology. I have been primarily interested in the investigation of the general chest conditions, and by chance have noted considerable variations in the size of the thymus not only in different infants but also at different times in the same infant. This was especially called to my attention by a patient of Dr. Carmody's, who at the age of 11 weeks, had a small thymus, visualized by the roentgenogram, and who died on the operating table at the age of 26 months. A roentgenogram taken after death and the necropsy showed a large thymus, large mesenteric glands and the other features of status thymicolymphaticus. It therefore became fundamental that some information be obtained as to these variations, which seemed to occur in healthy children as well as in those who died suddenly. Many writers use the terms, "normal, enlarged, pathologic," rather indiscriminately when describing varying conditions of the thymus, when the normal or pathologic state has never been accepted.

In correlating my observations on many infants, especially when I had the opportunity of making roentgenologic examinations of the same infant from birth to a few years of age, I found that many infants had a small thymus at birth, that this thymus then grew until the age of from 10 to 14 months and gradually receded, until at the age of approximately 28 to 32 months the mediastinal shadow was no longer broadened. It thus seemed that the thymus must have a period of growth in the first few months of life, reaching its greatest size when the child was about 12 months of age, and then receding until it was again a small gland when the child was from 28 to 32 months old. This I have called "the cycle of the thymus gland" (fig. 2). It must not be inferred that the gland entirely

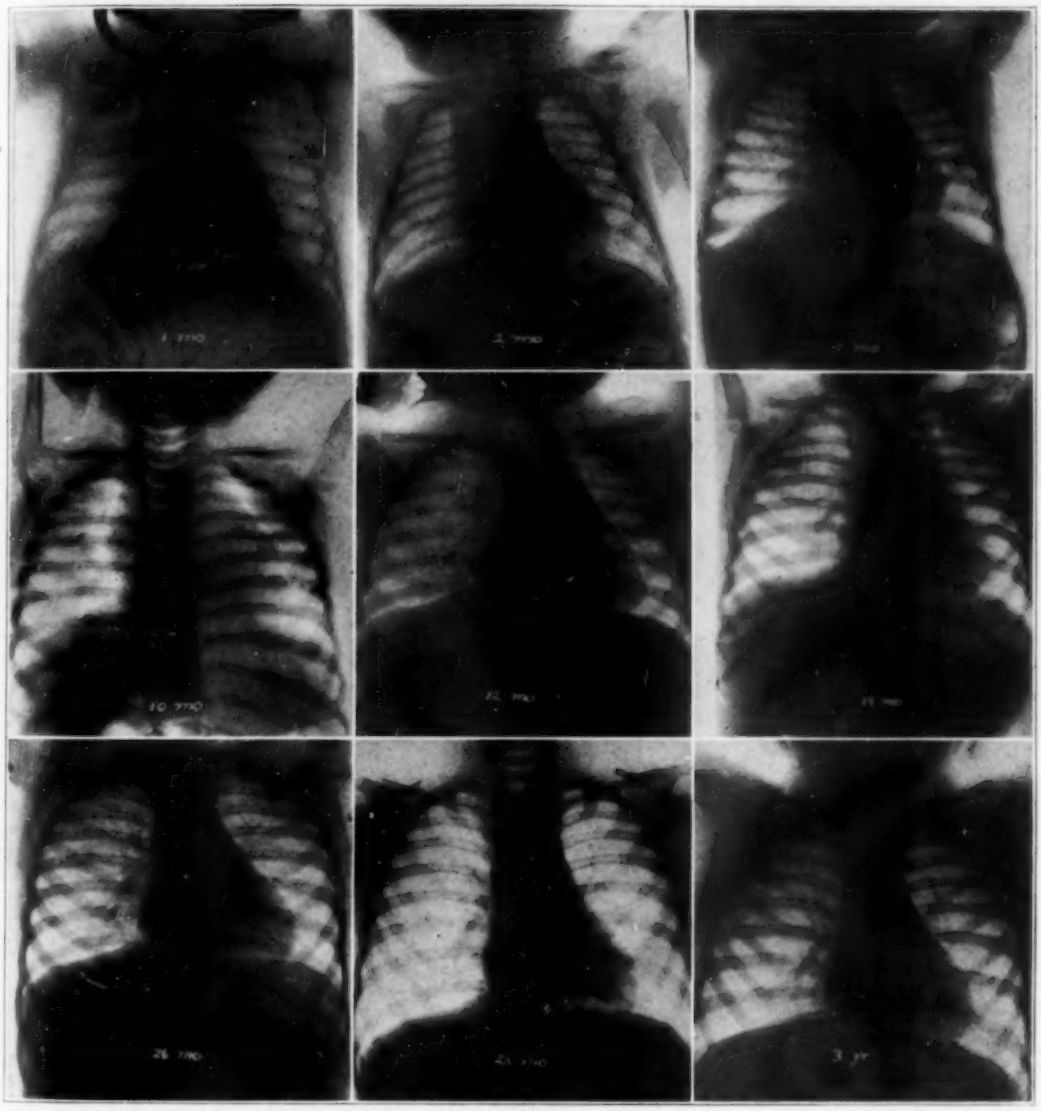


Fig. 2.—Infant showing cycle of thymus from the age of 1 month to 28 months, and also appearance as seen at the 3 year period.

disappears at 28 or 32 months, but rather that it has become correspondingly small. If this change in the latter months is due to molding from pressure of the lungs on either side, certainly this molding cannot explain the gradual enlargement of the gland in the first few months of life, nor the fact that in certain children there is no reduction in its size after 1 year of age (fig. 3). In some cases the increase in size during the first few months or weeks is rapid. On investigation of the literature, after making such observations, I find that Ellenberger and Baum have found a similar rapid enlargement of the thymus in puppies;

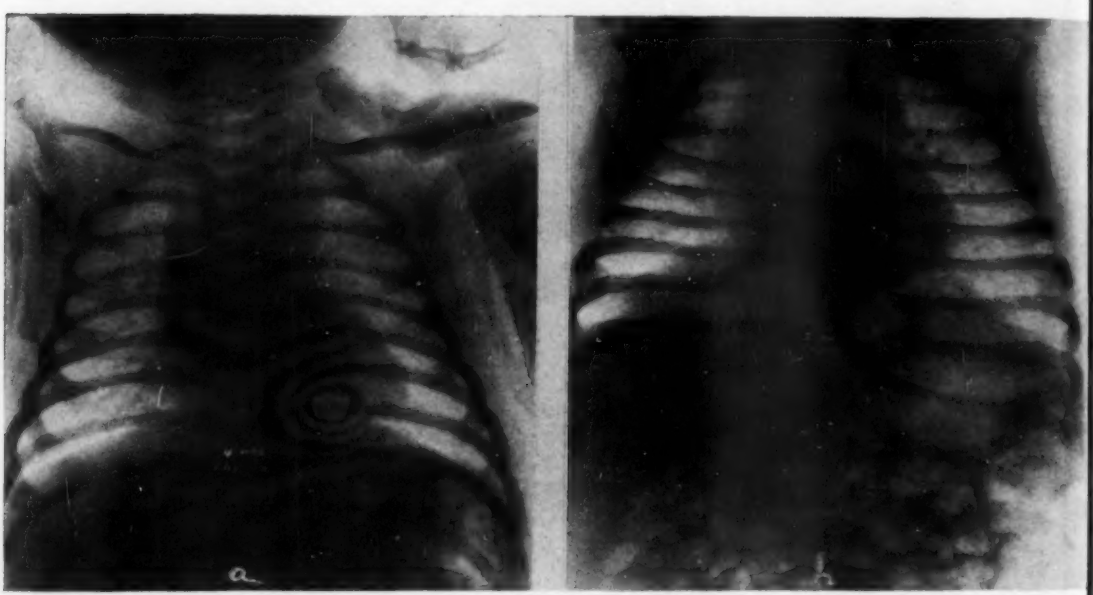


Fig. 3.—Rapid growth of thymus; (*a*) at 4 weeks of age; (*b*) same infant at 2 months of age.

Galen considered that the gland involuted at birth; Meckel, at the end of the first year, and Friedleben at the end of the second year. In fact, the literature is full of almost every conceivable theory as to thymic function or involution. It must be noted that this gland has been largely studied in the lower animals, and that its presence and involution have been demonstrated in fish and in reptiles. Its presence in the lower forms of life, much as in man, should be given considerable importance, as likewise the fact that its involution takes place early in life. If a curve of the thymic cycle is plotted (figs. 4 and 5) as I have just described, it suggests how a variety of opinions may arise from necropsy observations. Thus necropsy of an infant at birth might show a small thymus, whereas if this necropsy were performed at the end of one year the observations would be reversed, or again the same as at birth if

performed at the age of from 28 to 32 months. Statistics might then be confusing and be in favor of the small thymus under 2 years of age. It must be remembered in such studies that necropsy reveals certain pathologic conditions as present, or certain evidence as having been present, but does not give us any evidence as to what may have taken place in a normal physiologic condition. Deductions on the latter point can be made only after a tremendous number of necropsies at every age and under every conceivable condition, and even then vital information may be lacking. Further, no one has been able to say from the observations in a small gland whether or not this gland at one time may have been large.

Having found variations in the size of the thymus glands, I decided to attempt a classification based on size, and in looking over a number of infants I found that they fell naturally into three classes: The first is the small thymus which does not increase the transverse diameter of the mediastinal shadow or, in other words, is only one-third greater than the width of the bodies of the spine at the second interspace. The second class is comprised of a moderate-sized thymus, which is twice the diameter of the body of the thoracic vertebra at the second or third interspace. The third class is one in which the thymus is three or more times the width of the thoracic vertebra, or the large thymus. I further observed that an underweight child was likely to have a small thymus or an overweight child to have a large thymus. I then collected reports of 135 cases of infants under 2 years of age in whom the avaliable weights were accurate and the roentgenograms accurate in accordance with the technic already described and grouped them as to the weight into three classes, namely, the underweight, the average weight and the overweight, using the ordinary weight chart as a guide. In forty-four underweight infants, twenty-five small thymuses, eleven moderate-sized and eight large thymuses were found.[2] Of seventy-one infants of average weight, twenty-one had small, thirty-nine had moderate and eleven had large thymuses. Of twenty overweight infants, two had small, ten had moderate and eight had large thymuses. It thus becomes evident that the underweight infant is most likely to have a small thymus, the average weight infant a moderate sized thymus and the overweight infant a large thymus. Classifying these 135 subjects without regard to weight, I found forty-eight small, sixty moderate sized and twenty-seven large thymuses. But this classification did not take into consideration the cycle of the thymus nor the age, except that the infant must be under 2 years. I therefore selected thirteen infants who had been studied from birth to 3 or 4 years of age, in order that I might know the observations made the year following the 2 year period; these infants were

2. It is interesting to note that four of these infants were premature.

classified into infants who were underweight, those who were of average weight and those who were overweight, those at the birth period, at the 12 months' period and at 2 years of age, with the results [3] noted in table 1. From this table it will be noted that the number of infants fell predominantly into the small or moderate-sized columns at birth, the moderate or large at the 12 months' period, and again the small or moderate-sized columns at the 24 months' period.

TABLE 1.—*Thirteen Infants Studied from Birth to 4 Years of Age with Accurate Weights and Accurate Roentgenograms, Classified as to Weight and Size of Thymus at the Birth, Twelve Month and Twenty-Four Month Periods* *

	Small Thymus	Moderate Thymus	Large Thymus
Number of cases at birth (under 1 month), 13			
Underweight infants	1	1	0
Average weight	4	5	1
Overweight	0	0	1
Number of cases at 12 months, 13			
Underweight	0	1	1
Average weight	2	6	2
Overweight	0	0	1
Number of cases at 24 months, 13			
Underweight	2	0	0
Average weight	10	0	0
Overweight	1	0	0

* Percentage of small, moderate and large thymuses at these periods should be noted.

TABLE 2.—*One Hundred and Twenty-Eight Infants Classified as in Table 1*

	Small Thymus	Moderate Thymus	Large Thymus
Number of cases at birth, 77			
Underweight infants	11	4	2
Average weight	10	36	3
Overweight	1	9	1
Number of cases at 12 months, 32			
Underweight	4	2	0
Average weight	3	12	7
Overweight	0	2	2
Number of cases at 24 months, 19			
Underweight	3	0	0
Average weight	12	2	0
Overweight	1	1	0

Charts (figs. 4 and 5) were likewise plotted with curves to show the relation, if any, between the size of the thymus and the weight of the infant. It was then found that as the infant increased in weight there was a corresponding increase in the size of the thymus until 1 year of age, and then as the infant gained less rapidly in weight the thymus gradually receded. In like manner, several cases which did not show a typical thymic cycle were investigated, and it was found that the child did not show a typical gain in weight or perhaps had lost weight, but the cause for this variation in the weight curve was not evident.

3. Fifty-two additional infants have been studied in the same manner, but are not used in this series owing to the lack of roentgenograms at the exact age necessary for charting. They show similar cycles.

With this information at hand, a reclassification was made of the previous list of 135 infants into the birth, 12 months and 2 year periods, taking 128 cases in which there were accurate data at these three periods (table 2). Again it will be observed that this classification is similar to that in table 1 (13 series).

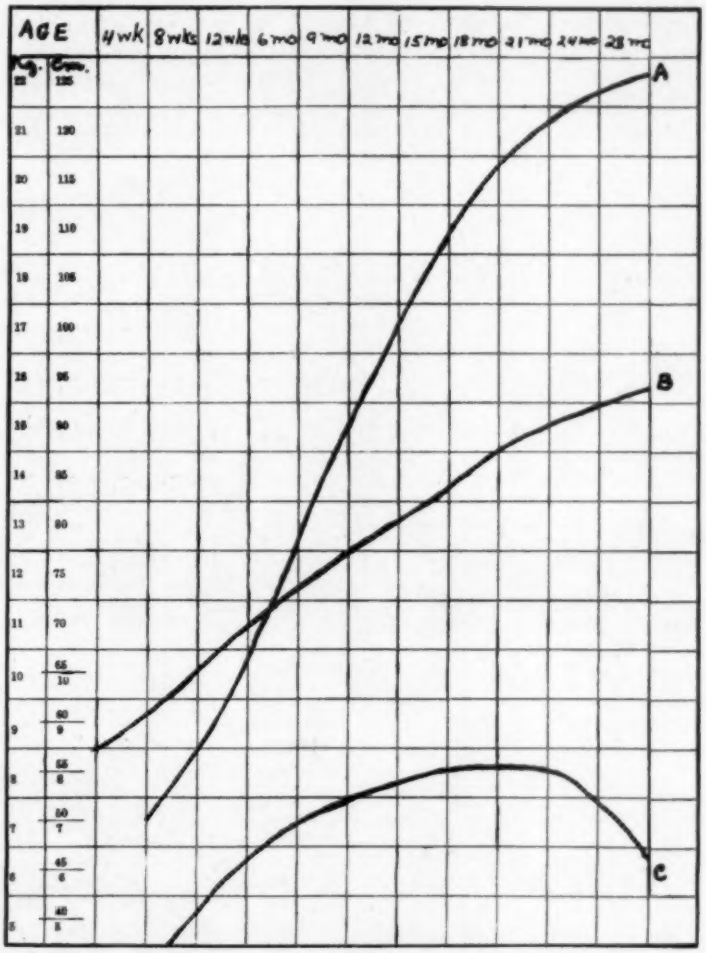


Fig. 4.—Curves illustrating the relationship of height (*A*) and weight (*B*) to size of thymus (*C*) in an average weight infant, F. C., born Aug. 28, 1922. Thymus curve plotted by taking transverse diameter of thymus at corresponding periods to weight and height.

In selecting the infants at birth, care was taken to have them a few days of age, in order that the thymus might have adjusted itself to the intrathoracic pressure so that the measurements might be more uniform. Finally, in analyzing these roentgenograms, it was found that a large

child at birth may have a moderate-sized or large thymus, and that this thymus usually enlarges until the child reaches the age of 1 year, but in a certain percentage the thymus does not recede, as may be seen by the roentgenograms taken when the child has reached the age of 2 years. It will be noted that of the thirteen cases, none show a moderate or large-sized thymus at 2 years of age. Likewise a small child at birth has a small thymus, but this thymus may increase in size as the child

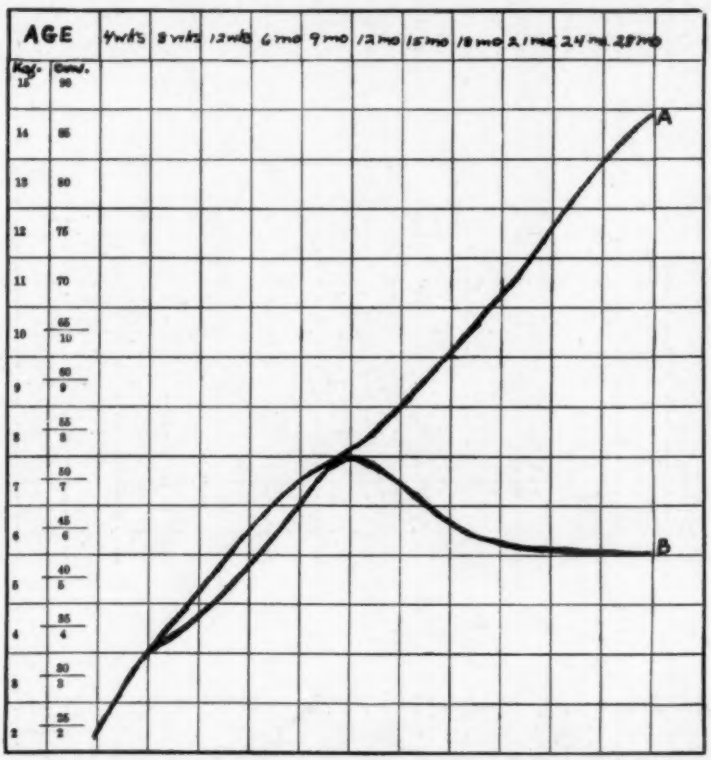
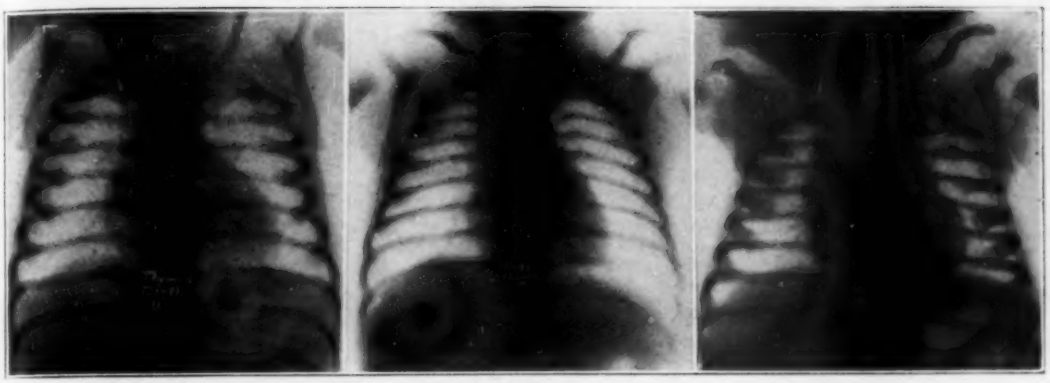


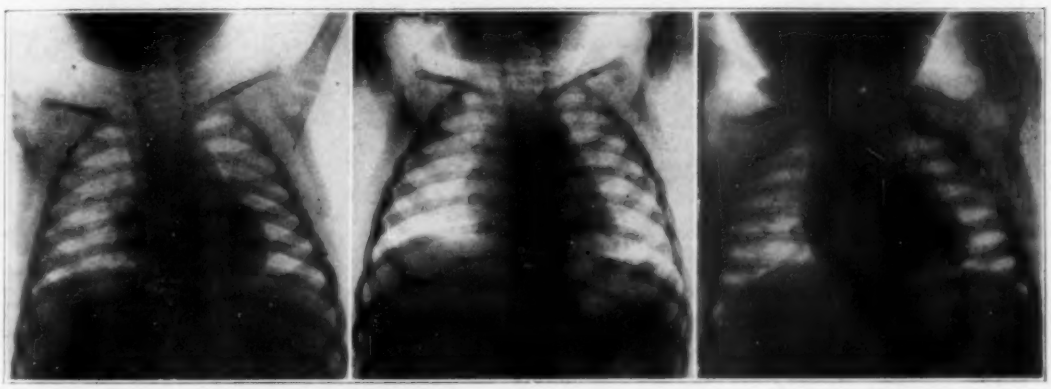
Fig. 5—Weight (*A*) and thymus (*B*) curves in an overweight infant, A. C. P.; born Oct 17, 1922. Note flattening out of thymus curve as weight continues to increase at the 24 month period.

increases in weight; but if at any time the child is below weight, the chances are that the thymus will be small. The child of average weight may have either a moderate-sized or a large thymus, as the distinction as to class is not so definite. Finally, of all the cases studied at the 24 month period, 16 per cent of the thymuses were of moderate size. This percentage would be reduced still further if the subjects were studied at the 28 or 32 month period.



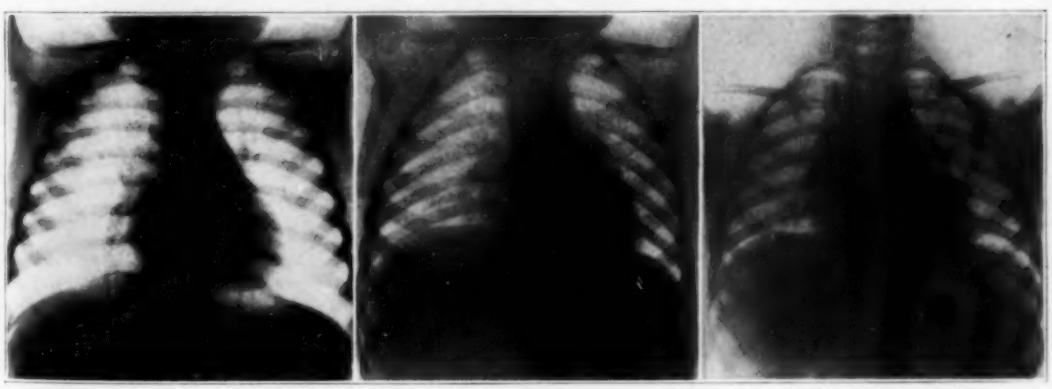
A B C

Fig. 6.—Thymuses of underweight (*A*), average weight (*B*) and overweight (*C*) infants seen at birth.



A B C

Fig. 7.—Thymuses of underweight (*A*), average weight (*B*) and overweight (*C*) infants as seen at the 12 month period.



A B C

Fig. 8.—Thymuses of underweight (*A*), average weight (*B*) and overweight (*C*) infants, as seen at the 26 month period.

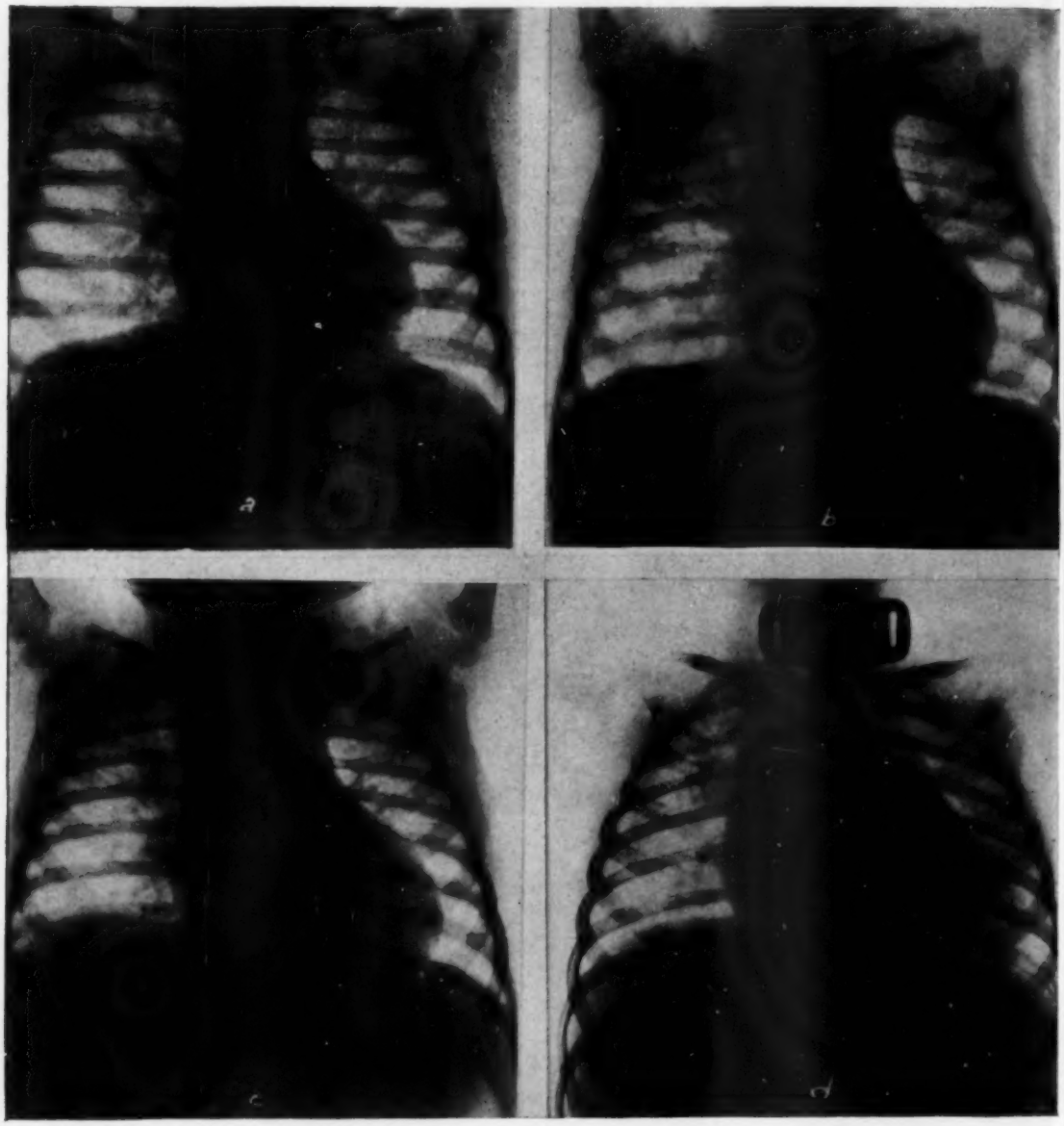


Fig. 9.—Shadow cast by mediastinal infection from abscess of neck resembling thymus. Note extension along the bronchi from the hilum. *A*, *b*, *c* and *d* are successive roentgenograms of the same infant over a period of one month.

No mention has been made in this paper of the physical examination of these subjects, as these reports will be made subsequently by Dr. Waring and reports of the results of the nose and throat examinations by Dr. Carmody.

COMMENT

As the thymus is supposed to play a part in the condition known as "status thymicolymphaticus," and as such subjects have large thymuses, the roentgenogram should then play an important part in our diagnostic procedure. Certainly, all overweight children should have the benefit of a roentgen-ray examination, and it is essential in those of average weight. I consider it less necessary in those who are underweight. It must also be remembered that the finding of a small thymus on one examination does not mean that a small thymus will be seen in future examinations, and I know of no way to safeguard a child except to make a roentgen-ray examination before any operation. It has been my experience that in subjects with thymuses measuring more than three times the width of the thoracic vertebra, the operation should be considered dangerous, but the mere presence of a thymus should not be considered a contrary indication. I personally fear operating on children over 2 years of age who have large thymuses. The aid in diagnosis gained by physical examination I shall not discuss, but I consider it valuable and necessary.

It is now the custom with us and with many institutions to recommend treatment by irradiation for certain large thymuses. This, of course, is rather empiric and is based on the experience of finding large thymuses when sudden death has occurred. Irradiation by radium or the roentgen ray will reduce the size of these thymuses, and also it seems that after such treatment the patients may be operated on with less fear of sudden death. Many patients are treated indiscriminately when a roentgenogram may by chance show a large thymus. Under 2 years of age, I feel that it is advisable to treat only those patients with large thymuses in whom an operation is necessary, or when the infant may be having some symptoms which are definitely due to a large thymus. I have seen patients under 2 years of age treated by irradiation when a roentgenogram happened to show a moderate-sized thymus, and yet may not this thymus be performing its proper function? When other errors in diagnosis are made, such as a diagnosis of bronchopneumonia with gurgling, the treatment is sometimes that given in thymus cases. Occasionally, it may be necessary to treat an infant for thymus when all the clinical symptoms point to a thymus but none is demonstrated. This may be due to a misplaced thymus, as I have stated previously. These cases must be unusual. In a number of patients treated at varying ages, I have observed no ill effects. It should be noted that in treatment by

irradiation there is only a relative reduction in the size of the gland, and all of its tissue is not removed. All the precautions necessary in gland therapy about the chest should be exercised.

CONCLUSIONS

First, the thymus gland in infants under 2 years of age can be accurately portrayed on the roentgenogram in a high percentage of cases.

Second, in the infant under 2 years of age the thymus is variable in size, not only in different types of infants but in the same infant at different times. These thymuses may be classified as to size, and it is found fairly definitely that underweight infants have small thymuses and that those overweight have large thymuses, while the average weight infant usually has a moderate-sized thymus but does not adhere so strictly to the rule.

Third, there is an increase in the thymus from birth to 1 year of age, which then reduces in size, with certain exceptions, when the infant is from 28 to 32 months of age.

Fourth, treatment by irradiation will reduce the size of the thymus, but should be used only when there are definite indications of enlargement.

DISCUSSION

Dr. Percy Luecke, Dallas: At the University of Michigan, Dr. Peterson and his co-workers found thymus glands enlarged in about 50 per cent of all newborn children. This was particularly true in those born of multiparous women. The children of women over 34 practically all had enlarged thymuses. That is of academic interest, and of practical interest to pediatricians and to otolaryngologists. The thymus has been held responsible for every disease from hiccup and colic to sudden death. There are, of course, certain conditions of the larynx that have to be considered with symptoms of an enlarged thymus, such as diphtheria, various forms of croup, laryngeal inflammation, the so-called gutter epiglottis with a narrow larynx, laryngismus stridulus and tumors of the chest and bronchial glands. Most persons with thymus symptoms later in life show similar symptoms when they are under 1 year of age.

As a rule, the symptoms appear during the first 3 or 4 weeks of life. Different symptoms are seen, and just what is the causative factor in these cases is questionable, whether it is congenital or whether there is a secretion which has some part in the causation of the symptoms. Clinically, some of these symptoms appear about the third day, others about the fourth week. Most of these patients show marked cyanosis, and usually respond rapidly to roentgen-ray treatment. There is a third group of patients in whom pressure is apparent, and in whom there is more or less marked stridor with cyanosis of secondary importance. The latter patients respond rather slowly to the roentgen ray, and in one patient it was necessary to employ radium to obtain a cure.

Dr. C. Ulysses Moore, Portland, Ore.: I should like to ask Dr. Wasson whether he has determined the effect of giving thymus gland on the weight of malnourished children? One of our Portland pediatricians, L. Howard Smith, has studied experimentally in guinea-pigs the pressure symptoms associated with a large thymus or other large mass in the superior mediastinum. He injected an amount of paraffin even greater than the size of the heart into the mediastinum. In some cases both the superior and anterior mediastinums were filled. In none did such pressure cause symptoms. If the volume in itself is without effect, then

the internal secretion of the gland must be the important factor. However, I have had infants with thymus glands measuring from 5 to 6 cm. in diameter which caused no symptoms and which did not reduce in size over a period of from two to three years. In one case, roentgen-ray treatments and two courses of radium had no apparent effect. I wish Dr. Wasson would state what his results are with the use of roentgen ray and radium on the size of the thymus.

Dr. H. F. Helmholz, Rochester, Minn.: Did the familial type of thymus enlargement show any symptoms?

Dr. William W. Wasson, Denver: I have not attempted to give credit for the literature on this subject, which is voluminous and dates back to Galen, who studied the thymus a good deal. I wish to call your attention to one observation. When necropsies were performed at different times in this cycle, an entirely different conception of the thymus was obtained. I think that accounts for the confusion in regard to necropsy reports. Dr. Moore brought up the question of thymus gland medication. I am not ready to report on that yet. I am not using the term "pathologic" gland, or "enlarged" gland; I have used the terms "small," "moderate size" and "large" thymus. With regard to treatment, I do not think we should treat the thymus gland indiscriminately in children under 2 years of age; in children over 2 years, I am suspicious of a large thymus gland. The thymus gland usually responds well to therapeutic treatment with the roentgen ray. Roentgenograms should be made on every child before operation, especially on those who are large or of average size. The smaller children are not so likely to have a large thymus. In regard to the various families: In children of some families death has occurred on the operating table; in other members of the family a large thymus has been found by means of roentgenograms. This is true in the case of which I have just spoken. Children under 2 years of age have been sent to Denver for roentgen-ray treatment. In some of these no symptoms have been found and I have refused to treat them. Until more is known about the function of the thymus one should use discretion in treatment.

ACUTE SUPPURATIVE MEDIASTINITIS

REPORT OF A CASE

FRED E. BALL, M.D.
CHICAGO

This case report is submitted because of its unusual character and because of the fact that the nature of the trouble was verified by observations at necropsy. It seems best to present the facts as they occurred from day to day.

REPORT OF CASE

History.—J. B. T., a white man, aged 56, had an essentially negative history, except that he had had cerebrospinal syphilis. Three weeks previous to the present illness he finished a course of potassium bismuth tartrate, a total of 2 Gm. in ten intramuscular injections at five day intervals. The Wassermann reaction of the blood was negative and the Wassermann reaction of the spinal fluid was 2 plus. In the afternoon of March 5, the day of the present illness, he noticed some difficulty in swallowing. He had felt very well all day up to that time. I saw the patient at 10 p. m., at which time dysphagia and beginning hoarseness were the only complaints. No dyspnea was present. The throat was normal except for slight redness of the tonsillar pillars. Physical examination otherwise was negative. The temperature was 102.8 F.

Course of Illness.—On March 6, at 3 p. m., dysphagia was more pronounced. The voice was hoarse and slight dyspnea was present. The throat was essentially normal. The larynx was examined and no membrane was seen, but the vocal cords were somewhat swollen. The temperature was 101 F. Direct laryngeal smears were made which were negative for the diphtheria bacillus. Cultures were taken which later proved to be negative.

At 9 p. m. on the same day, dyspnea was marked. The patient could not swallow, and a dry cough was present. The throat was normal. The larynx was examined by Dr. George E. Shambaugh, who reported marked edema with no fixation of the cords and a subglottic swelling. Hospitalization was advised in order that tracheotomy might be carried out at any time if the dyspnea increased.

About 2 a. m. on March 7, the patient began to expectorate a foul, blood tinged, purulent material. This relieved the dyspnea markedly and the tracheotomy was temporarily postponed. The maximum rectal temperature during the day was 102 F.

The patient remained about the same on March 8, 9 and 10. Expectoration continued and halitosis was marked. The rectal temperature ranged from 100 to 101.4 F. Three cultures were negative for diphtheria bacilli. Smears of expectorated pus showed a mixed infection. On March 10, Dr. H. E. Jones noticed what was thought to be grayish-white membrane to the right of the epiglottis. Cultures made of this later were negative for diphtheria bacilli. Smears showed a mixed infection.

On March 11, the patient felt quite well in the morning. The rectal temperature was 100.4 F.; the pulse rate was 96. At 11 a. m. the patient began to choke, became cyanotic and the pulse became very rapid. The choking soon subsided, but the pulse remained rapid and thready. The heart began to fibrillate, and the patient became stuporous. Dyspnea was marked, and a tracheotomy was performed at 3:15 p. m. in the patient's room by Dr. H. E. Jones. Death occurred at 3:45 p. m.

Necropsy.—This was performed by Dr. W. S. Bump in Dr. Edwin F. Hirsch's laboratory at St. Luke's Hospital. There was no change in the nasopharynx or the hard or soft palate. The epiglottis was much thickened and its edge was rounded. The finger entered the larynx only with force. Owing to edema, the wall of the esophagus was markedly thickened down to the diaphragm, and the lining was covered with yellow-green pus. The surgical opening into the trachea was just above the isthmus of the thyroid gland. The tissues around the thyroid were edematous, but no pus was found on the left side. Between the right lobe of the thyroid gland and the larynx the tissue was soft, moist and infiltrated with a great deal of pus. The thyroid gland itself was normal in appearance and weighed 60 Gm. Except for thickening caused by the edema, the tissues of the larynx and trachea were normal. The lining was intact except for the tracheotomy wound. From the level of the tip of the thyroid cartilage to the region

Appearance of pharynx, showing position of perforations.

of the diaphragm, the tissues surrounding the esophagus were moist, thick with edema and pierced by many cavities, most of them continuous and containing thick, green-yellow pus. There was a deep pus cavity just to the right of the tip of the thyroid cartilage, extending for 3 cm. anterior, almost to the front of the larynx, and connecting with abscesses lower down in the periesophageal tissues as well as the pharyngeal cavity. The opening into the pharynx, from which green-yellow pus flowed, was about 9 mm. in diameter, and was just to the right of the highest portion of the thyroid cartilage on the right side. The lining of the esophagus was intact. The right lung was roughened by fibrous tissue on its mediastinal surface and was crepitant throughout. Surfaces made by cutting were yellow-pink. There were no regions of consolidation. The lung weighed 600 Gm. The left lung was similar to the right in all essential respects, and weighed 570 Gm. Both lungs contained more air than usual and were spongy.

Anatomic Diagnosis.—These conditions were diagnosed: (1) marked suppurative inflammation of periesophageal tissues with purulent discharge into the pharynx; (2) marked edema of the glottis and epiglottis; (3) marked hyperemia of the pharynx, uvula and epiglottis; (4) marked acute vesicular emphysema of both lungs; (5) disseminated fibrous leptomeningitis (syphilitic), and (6) slight syphilitic aortitis.

Smears from the mediastinum taken at necropsy contained frequent leukocytes and gram-positive cocci, singly, in pairs, clustered and in chains. These were similar to the direct smears made from the esophagus before death.

COMMENT

There have been various explanations of the exact course of this condition. Some have thought the pharyngeal ulcer was primary and that the abscess was secondary. I was unable to obtain a history of any injury to the pharynx. It is possible to have an ulcer form as the result of an infection, but as this was the only ulcer in the entire pharynx or esophagus, such a cause would be unusual. It is my opinion that the mediastinum was first infected through the lymphatic glands, most likely caused by some throat infection, a history of which was not obtained because it was not severe enough to be noticeable. The early dyspnea and edema were caused by the mediastinitis and the resulting pressure from the distorted tissues. These symptoms were relieved when the patient began to cough up the purulent exudate, and I believe this was the time of the pharyngeal perforation. The so-called membrane of course was the ulceration around the perforation, which was not noticed even though numerous examinations were made. Lerche [1] has reported a case of mediastinal abscess from an infection in the throat. In his patient, in whom the condition was chronic, he believes the lymph nodes of the recurrent chain were infected and that the abscess began there. This abscess followed the usual course of posterior mediastinal infections and pointed in the neck. In the case reported here, which I believe to be of similar etiology, the abscess ruptured into the pharynx because of destruction of the tissue planes.

122 South Michigan Avenue.

1. Lerche, Wm.: Surg. Gynec. Obst. **32**:232 (March) 1921.

EROSION OF THE PETROUS BONE BY ACOUSTIC NERVE TUMOR

DEMONSTRATION BY ROENTGEN RAY *

E. B. TOWNE, M.D.
SAN FRANCISCO

Acoustic nerve tumors are usually diagnosed without difficulty in advanced stages, because of the typical chronologic sequence of symptoms due to their origin from the eighth nerve. The first symptom is tinnitus, followed by deafness of the involved side. After a time, these are followed by signs of cerebellar incoordination due to pressure of the growing tumor in the cerebellopontile angle; by palsy of the fifth and seventh nerves, which are stretched over the tumor, and, finally, by symptoms of internal hydrocephalus due to pressure on the aqueduct of Sylvius. The interval between the onset of auditory symptoms and the appearance of the signs which make the diagnosis usually is prolonged. In Cushing's [1] latest tabulation of his material, the recorded duration of auditory symptoms in forty-six cases varied from six months to seventeen years, and averaged five years before surgical treatment was instituted. During this interval the diagnosis of acoustic nerve tumor may be suspected, but cannot be confirmed until the adjacent cranial nerves and the cerebellum are involved.

It is obviously most desirable that earlier diagnosis should be made, so that the tumor may be operated on while it is still small, and while the patient is in good condition. The tumors almost invariably arise from the peripheral portion of the eighth nerve in the internal auditory canal, and erode the petrous bone as they grow. The usual picture of the internal auditory meatus at necropsy is shown in figure 1. Henschen,[2] in 1912, believed that he had demonstrated this erosion in roentgen-ray plates, but, as Cushing [3] pointed out, his illustrations show the external, not the internal auditory, meati. Cushing,[3] who also used lateral projections with horizontal ray, said, "It has been disappointing, however, to find that, even in advanced cases, there is apt to be little demonstrable difference between the pori interni of the affected and

---

* From the Department of Surgery, Stanford University Medical School.

1. Cushing, Harvey: Concerning the Acoustic Neuromas, Laryngoscope **31**:209 (April) 1921.

2. Henschen, Folke: Die Akustikustumoren, eine neue Gruppe radiographisch darstellbar Hirntumoren, Fortschr. a. d. Geb. d. Röntgenstrahlen **18**:207, 1912.

3. Cushing, Harvey: Tumors of the Nervus Acusticus, Philadelphia, W. B. Saunders Company, 1917. Footnote, p. 157.

unaffected side." Here the matter has rested, with the knowledge that the extensive erosions should be, but usually were not, roentgenographically demonstrable.

Dr. W. E. Chamberlain, of the Department of Roentgenology of Stanford University Hospital, has recently succeeded in showing the destruction of the petrous bone in a verified case of acoustic nerve tumor. Instead of making lateral projections of the skull, in which the internal and external auditory meati of the two sides are identified with difficulty, he used a posterior projection in which the petrous bones are shown in profile. The two bones can thus be compared on one set of stereoscopic films. With the patient on his back, the head is flexed at the top of the neck, so that the chin is drawn backward. The center of the

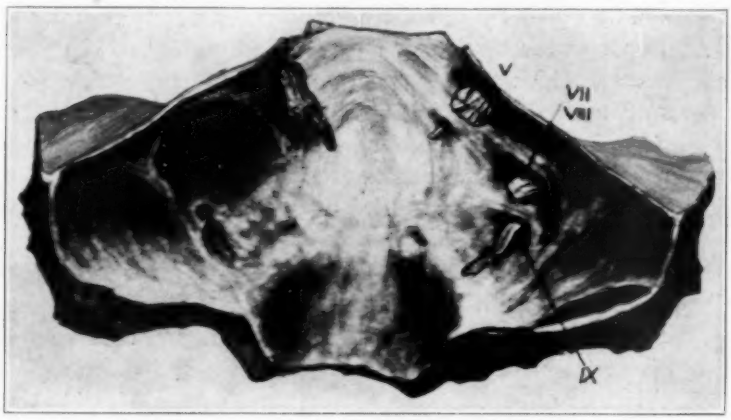


Fig. 1.—Erosion of the petrous bone produced by a left acoustic tumor (after Henschen, footnote 2).

film is placed under the foramen magnum, and the central ray is directed at the center of the film through the midline of the frontal region, at a point about 3 inches above the level of the eyebrows.

Dr. Carl W. Rand of Los Angeles saw these films, and sent the roentgenograms made by Dr. Carter, according to this technic, with clinical notes of two of his patients at the Los Angeles General Hospital. In both, the erosion was clearly shown.

CASE REPORTS

CASE 1.—Mrs. J. N. E., aged 31, admitted to Stanford University Hospital, March 31, 1926, had been seen the preceding day by Dr. E. H. Eiskamp of Watsonville, Calif., who reported that she had come to him complaining of a facial palsy. She was dizzy and had fallen once. The illness began three years prior to this examination, with roaring and ringing in the left ear, followed by dizziness. Later she became completely deaf in that ear. She then noticed that she could not close the left eye, and gradually a facial paralysis developed, accompained by partial sensory loss in the distribution of the left fifth nerve. The gait had become ataxic. She was deaf in the left ear. There was a peripheral

palsy of the left seventh nerve, and diminution of sensation of the left side of the face. Dr. Eiskamp believed that she had a cerebellopontile angle tumor.

Examination added little to this graphic description of an eighth nerve tumor. The patient had no headache, vomiting or loss of vision. The optic disks were normal. Tests of the vestibular apparatus showed complete paralysis of the left vestibular nerve (Dr. J. A. Bacher). The left cornea was anesthetic, and there was hypesthesia over the remainder of the field of the left fifth nerve. The left facial paralysis was complete. There was no nystagmus, and no ataxia of the arms was present. The left leg was ataxic, and the Romberg sign was positive.

Fig. 2 (case 1).—Enlargement of the left internal auditory canal.

The report on the roentgenogram of the skull (fig. 2) was as follows: "Stereoscopic study in occipital projection shows the petrous portion of the temporal bones very well. The internal auditory canal on the right can be made out fairly clearly and appears to be of normal diameter. On the left, the internal auditory canal presents a very marked conical expansion at its inner end, the internal auditory meatus reaching a diameter of over 1 cm., and the upper surface of the petrous bone being lifted to a considerable degree."

April 7, an occipital craniectomy was performed under local anesthesia through a midline incision, by a technic recently described.[4] The tumor was exposed in the

4. Towne, E. B.: Exploration of the Cerebellum, Surg. Gynec. Obst. **43**: 204 (Aug.) 1926.

left cerebellopontile angle, and a thorough intracapsular removal followed. After the tumor had been scooped out, the index finger easily entered the dilated internal auditory meatus. During operation, the cardiac rate and the blood pressure readings remained constant. After closure, the rate was 60, and the pressure was 140 systolic, 82 diastolic. Microscopic sections of the tumor showed a typical acoustic neuroma. Convalescence was uneventful. There was increased motion of the left side of the face on the evening of operation, and the improvement continued slowly but steadily. The sensory loss was no longer demonstrable after a week, except in the cornea, which was hypesthetic. June 11, the patient reported for observation. She had gained 8 pounds (3.6 Kg.) in weight. She had

Fig. 3 (case 2).—Enlargement of the left internal auditory canal.

no dizziness, and the gait was nearly normal. The left side of the face was much stronger; the lower part was almost normal, but the brow and eyelids were weak. Sensation of the left cornea was still impaired.

Case 2.—(Notes from Dr. Rand.) Mrs. F. L., aged 52, was admitted to the Los Angeles General Hospital, March 9, 1926, complaining of dizziness, unsteady gait, double vision, with tinnitus and deafness of the left ear. Examination showed advanced choked disks, nystagmus, weakness of the left sixth nerve, anesthesia of the left cornea and hypesthesia of the second division of the left fifth nerve, left hemiparesis with increased deep reflexes, and pathologic great toe

signs on the left. Hearing was lost on the left and almost lost on the right. Otoneurologic studies showed that responses from all canals of both ears were reversed. During the patient's stay in the hospital, headache, failing vision and increase of cerebellar symptoms gradually developed. May 4, a roentgenogram of the skull by Chamberlain's technic showed erosion of the petrous portion of the left temporal bone (fig. 3). At operation, May 8, a large acoustic nerve tumor was encountered on the left side, and subcapsular removal was the procedure followed.

CASE 3.—(Notes from Dr. Rand.) Mr. E. B., aged 48, was admitted to the Los Angeles General Hospital, Nov. 13, 1925, complaining of tinnitus in the left ear for seven years; deafness of the left ear for three years; vertigo, staggering gait, headache and vomiting for six months, and failing vision for three months. Examination showed old choked disks, nystagmus, ataxia of the left arm and leg, and a positive Romberg sign. The fifth, sixth and seventh cranial nerves were normal. Otoneurologic studies showed absence of response from all canals on the left side, and from the vertical canals on the right side. An operation was performed, Jan. 14, 1926, with the subcapsular removal of a large acoustic nerve tumor from the left cerebellopontile angle. May 4, the patient returned for roentgen-ray studies. The stereoscopic films showed erosion of the left petrous bone, enlargement of the internal auditory meatus, and even more marked lifting of the upper surface of the petrous bone than that which may be seen in figure 2. The films were not clear enough for a satisfactory reproduction.

SUMMARY

Tumors of the eighth nerve arise in the internal auditory canal and erode the petrous bone. There is a long interval, averaging about five years, between the onset of the initial auditory symptoms and the appearance of the signs which make the diagnosis certain. The signs consist of palsy of the fifth and seventh nerves, cerebellar ataxia and internal hydrocephalus. During this interval the diagnosis cannot be made, because tinnitus and nerve deafness may be due to other causes. Previous attempts to show the erosion of the petrous bones in roentgenograms with lateral projection have been unsatisfactory. In all three cases of verified acoustic nerve tumor examined roentgenographically with the occipital projection described in this paper, extensive erosions of the petrous bone on the side of the tumor have been shown clearly. It seems probable that the use of this technic during the period when only auditory symptoms are present may lead to earlier diagnosis and surgical treatment. It should certainly be valuable as confirmatory evidence in the diagnosis of more advanced acoustic tumors.

350 Post Street.

Clinical Notes

A NEEDLE IN THE CERVICAL REGION TOLERATED FOR FIVE MONTHS

J. N. Roy, M.D., Montreal
Associate Professor to the University of Montreal; Physician to the Notre-Dame Hospital; Laureate of the Academy of Medicine of France

On account of an unexpected observation when an operation was performed, I believe it is of interest to publish the following brief note. It has for its object the demonstration of the tolerance of a needle in the neck which was localized in its tissues for a period of five months; also the underlining of the possible complications to which the patient was exposed during that time. The history of the case is briefly reported.

REPORT OF CASE

History.—R. M., a woman, aged 22, consulted me at the Notre-Dame Hospital, April 12, 1926, for a tumefaction of the cervical region on the right side. She stated that on April 8 her neck on that side commenced to pain and to swell gradually. She had not recently suffered from any acute or chronic infection of the throat.

On examination, I saw that the entire region of the right sternocleidomastoid muscle was red, tender and swollen. However, there was no sign of fluctuation.

The nasal passages were normal. There was nothing of interest on examination of the rhinopharynx. The tonsils had been entirely removed two years before the examination.

The patient's temperature at the time of examination was 101.3 F.; she was put to bed, and hot fomentations were applied.

April 13, the temperature was 103. The tumefaction and the pain were more marked than on the previous evening, and as there now existed a slightly softened place, I decided to perform an operation the following day. The hot fomentations were continued.

After the usual preparation, the patient was given a chloroform anesthesia, and I made an incision along the anterior border of the sternocleidomastoid muscle opposite its lower third. Before reaching the pus, I was obliged to penetrate to a depth of 2.5 cm. On opening the abscess, a yellow and odorous matter, unmixed with blood, poured therefrom. I inserted a finger in order to explore the cavity, and was astonished to feel a sharp foreign body lying in a downward position of about 30 degrees, which pointed in the direction of the blood vessels to the right. Under the control of my index finger, and by means of forceps, this foreign body was pushed toward the larynx and afterward was easily extracted. I then perceived a strongly oxidized needle, which measured 4 cm. in length. The abscess was allowed to drain for several days, the hot fomentations were continued, and recovery followed its normal course.

Questioned again on the subject of this needle, the patient informed me that on Nov. 10, 1925, at midday, she was eating bread, meat and mashed potatoes, and that while swallowing she felt a very sharp pain on the right side of the neck. Being under the impression that she had simply swallowed a bone which might have scratched the mucous membrane of the pharynx, she finished her meal. In the afternoon, as the pain was more acute, and because she spat a little blood and felt a foreign body in her throat, she was given a gargle which she continued to use until the symptoms disappeared. About eight days after the accident, the pain diminished little by little, and two weeks later it

had entirely disappeared. The patient then believed that she was cured and remarked nothing abnormal until December 10, when she noticed that her neck was somewhat stiff, and her head slightly inclined toward the right. Her throat was not sore; she simply felt a fulness in the cervical region of the right side. As she coughed and became thinner, a physician whom she consulted sent her to the country in February, 1926. The change of air had no effect on her cough, and she continued to lose weight until the operation. The patient was more susceptible to cold than in previous years. She had never had any symptoms with regard to her heart, respiration or nervous system. She was very calm, and presented none of the signs that are noticeable in nervous persons.

At the first examination, I observed the stiffness of the neck, but that was interpreted as being a reaction of muscular defense in the presence of inflammation of the tissues.

In view of the fact that cervical abscesses are fairly frequent, the idea of a roentgen-ray examination to locate the possible presence of a foreign body did not occur to me.

May 3, the patient left the hospital absolutely cured, and commenced to recover the weight she had lost during her illness.

CONCLUSION

I will leave to my readers to appreciate for themselves the consequences that might have resulted from that accident, if the route by which this foreign body passed into the neck had become infected more tardily, thereby favoring later penetration of the needle into the large blood vessels, or coming into contact with the pneumogastric or sympathetic nerves.

A NEW PROCEDURE IN THE TREATMENT OF CHRONIC MAXILLARY SINUS SUPPURATION IN CHILDREN*

ARTHUR M. ALDEN, M.D., ST. LOUIS

In the treatment of chronic maxillary sinus suppuration in a child, a physician is mainly concerned with the problem of securing adequate drainage and some means by which these sinuses may be frequently and comfortably irrigated. Dean conducts all sinus treatments in children under ethylene anesthesia. No matter of what type or what the anesthetic agent may be, general narcosis is never without danger, and it is not pleasant to administer a general anesthetic from six to twenty times to a child.

In a paper read two years ago, Shea suggested opening the antrums underneath the inferior turbinate and inserting a rubber tube through which the sinus could be irrigated daily with no discomfort to the child. This seemed a rational procedure, but when put into practice certain technical difficulties immediately became manifest. In the first place, the insertion of a straight rubber tube around the corner through the small nostril of a child is not as easy as it sounds. Second, the straight tubes, even though once comfortably placed in the sinus, slip out easily, and it is almost impossible to replace a tube without a general narcosis. The added danger of the tube becoming dislodged from the sinus and becoming a foreign body in the lung must always be kept in mind.

* From the Department of Otolaryngology, Washington University Medical School.

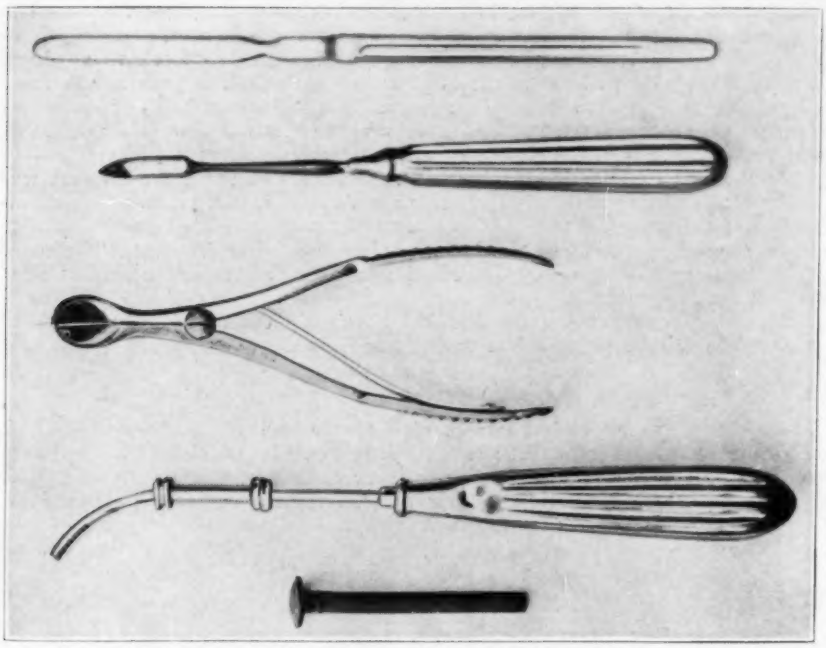


Fig. 1.—Instruments used in maxillary sinus intubation.

Fig. 2.—Withdrawal of the obturator from the tube.

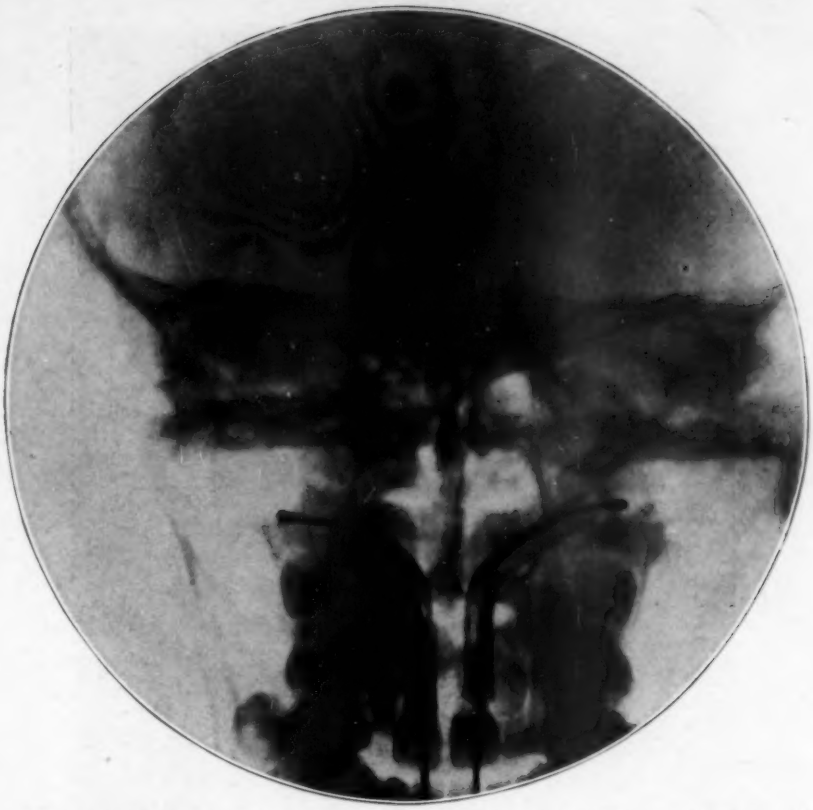


Fig. 3.—Anteroposterior view, showing tubes in position and probes in the maxillary sinuses.

Fig. 4.—Lateral view, showing tubes and probes in the maxillary sinuses.

Fig. 5.—Patient with tubes in the sinuses.

Fig. 6.—The technic of irrigation.

With a view to avoiding the objectionable features associated with the use of the straight tube, I had made a small rubber tube with a soft rubber flange on one end. When placed in the maxillary sinus, this tube is anchored there by means of the flange so that its accidental displacement is almost impossible. In order to make the insertion of the tube easy, an obturator with a slide was devised, so that when the flanged end of the tube is in the antrum the tube can be held in position while the obturator is withdrawn.

The instruments necessary for antrum intubation are a flat Killian elevator, a nasal speculum, a Bishop antrum perforator and the antrum tube with the obturator. Under gas anesthesia, the anterior tip of the inferior turbinate is slightly infracted and raised up by means of the flat Killian elevator. The antrum perforator is then inserted, and an opening is made about two thirds of the way back on the naso-antral wall. The obturator carrying the tube is then passed underneath the inferior turbinate, and the flanged end of the tube is pushed into the antrum. The tube is then held in position by means of the slide on the obturator while the obturator itself is withdrawn. The tip of the turbinate is then pressed back downward, and the operation is completed.

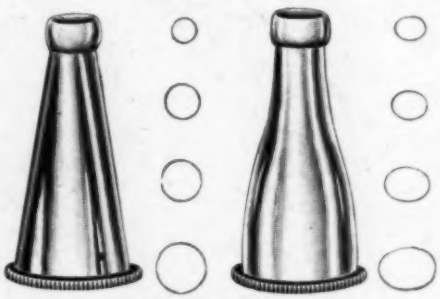
The following day, a curved, ball pointed probe is passed through the tube into the antrum to be sure that its lumen is not occluded with blood or secretion. Irrigation is then carried out by means of a bulb syringe to which a glass medicine dropper tip is attached. After thorough irrigation, the antrum is flushed with 1 per cent mercurochrome-220 soluble or with 2 per cent silver nitrate solution. This procedure is carried out daily until the sinus is free from secretion. As a rule, this requires about ten days or two weeks.

In my series of cases only two mishaps have occurred from the use of these tubes. For some reason or other the intubation was more than ordinarily difficult in one child, and a transient edema and ecchymosis occurred around the left eye. This disappeared in a few days. In another child a unilateral otitis media developed, which cleared up four days after the drum was incised.

AN IMPROVED AURAL SPECULUM

GEORGE L. RICHARDS, M.D., FALL RIVER, MASS.

The ordinary aura speculum of either the round or the oval type has a sharp edge at its distal end, and unless used carefully may be painful on introduction into the canal. It tends also with time to become distorted in shape, while the



Aural specula.

thin edge necessary to a maximum lumen becomes still sharper. To make the speculum more comfortable for the patient, without at the same time lessening the visual field, I have modified both the round and the oval forms by the addition of an elliptic shoulder of spun brass flush with the distal

end, applied with such a flat curve as to increase but little the outside diameter, and to avoid any liplike projection. Hence practically the same internal lumen is available as in the ordinary speculum, with more comfortable introduction and an added facility in pushing to one side cerumen and epithelial débris clinging to the canal wall.

These specula, the details of which are well shown in the illustration, have been made for me by V. Mueller & Co., and are available, both round and oval, in four sizes. The essential thing in manufacturing the instrument is to have the spun brass shoulder as flat as possible, in order to attain the desired object of minimum size and maximum visibility.

Basically, the instrument is an adaptation of that furnished with the Bruening-Siegle otoscope.

CORRECTION

In the article by Dr. John Tait, "Ablation Experiments on the Labyrinth of Frogs" (ARCH. OTOLOLARYNG. **4**:281 [Oct.] 1926), the fifth line at the top of page 293 should read: "2 degrees per second per second suffices to cause conscious sense of rotation in a."

PROGRESS IN OTOLARYNGOLOGY

Summaries of the Bibliographic Material Available in the Field of Otolaryngology

TUBERCULOSIS OF THE THROAT

GEORGE B. WOOD, M.D.
PHILADELPHIA

PRIMARY TUBERCULOSIS OF THE TONSIL

Primary tuberculosis of the tonsil is not an uncommon condition, but it is seldom recognized clinically. Several years ago, I compiled a large number of cases reported by thirteen or more authors; I found that about 4.5 per cent of all tonsils and adenoids removed at operation showed positive tuberculous lesions. In these cases there was no reference to the presence of cervical adenitis, pulmonary involvement or other associated tuberculous lesions; these were merely the routine tonsil and adenoid cases.

In relation to these observations it is interesting to note that Korns [1] found one case of tuberculosis of the adenoids and one of the tonsils in seventy-four tonsillectomies and adenoidectomies performed on patients at the Peking Union Medical College. Among forty-six Chinese he found one case of tuberculosis of the adenoid which was associated with tuberculosis of the lymph nodes. Korns felt that although this series was too small for statistical purposes it would indicate a lower incidence in the Chinese than in other races, and he thought that the fact that the Chinese do not drink cow's milk might, in part, be responsible for this difference. This idea of the infection of the tonsils from tubercle bacilli in food is important and, in fact, the occurrence is quite possible. It has been shown by several experimenters that the tonsils of hogs may be readily infected by tubercle bacilli in food; in fact, every hog fed with food containing tubercle bacilli developed tuberculosis of the tonsils.

An unusual case of primary tuberculosis of the tonsil is reported by Brown and Doig.[2] The uncommon character of this case was the acuteness of the disease; with no previous illness, it caused the death of the patient in four or five weeks. At the postmortem examination a large peritonsillar abscess containing 30 cc. of pus was found. Portions of the tonsil and ulcerated soft palate, examined microscopically, contained typical giant cell systems and numerous tubercle bacilli in the tissues. It is probable that in this case there was a secondary infection which was the

1. Korns, J. H.: China M. J. **39**:899-903 (Oct.) 1925.
2. Brown, A. E., and Doig, K. M.: M. J. Australia **1**:86 (Jan. 24) 1925.

important factor in the production of this abscess. It is unusual to see marked tuberculous destruction of the tonsil in primary lesions, although extensive ulceration is sometimes seen in late pulmonary cases.

In a case reported by Doyle,[3] there was severe dysphagia almost a month before any clinical evidence of tuberculosis in the tonsil could be seen. The patient had had pulmonary tuberculosis, but at the time of the throat symptoms this was not active. In early tuberculosis, severe tonsillar pain without the slightest visible alteration in the clinical appearance is not uncommon. In this case reported by Doyle, if a section of the tonsil had been removed when the pain first began, it is probable that numerous tubercles would have been found in its structure. To repeat, it is impossible to diagnose early tuberculosis of the tonsil from the clinical appearance, and usually it is recognized only when ulceration has taken place.

LARYNGEAL TUBERCULOSIS

Stephani,[4] in a comprehensive article on the entire question of laryngeal tuberculosis, says that this complication is not frequent in pulmonary phthisis, being present in not more than one case out of twenty, and that usually the prognosis is three times as unfavorable as in uncomplicated pulmonary tuberculosis. It is difficult to accept either of these statements as accurate. Other statistics have shown that in early pulmonary conditions some laryngeal involvement may be found in from 15 to 20 per cent, and in late cases, as shown by necropsy, in as high as 40 per cent. Also, I do not feel that the prognosis is as grave as Stephani implies, that is, if proper treatment can be instituted. Of course, when the lesion has advanced to such a stage that nutrition becomes almost impossible, the case is practically hopeless, but in the incipient cases a cure of the local lesion should be obtained in more than 75 per cent of the cases. When a patient in the early stages is properly cared for, there should be little interference with proper nutrition.

The presence of a pulmonary lesion always inclines the examiner to make a diagnosis of tuberculosis; although in 90 per cent or more of the cases he will be right, he must not forget that carcinoma and syphilis may occur in persons with tuberculosis of the lungs and that an accurate diagnosis is important in these cases. Jones [5] calls our attention to the necessity of this differentiation, but says that sometimes it is impossible to differentiate carcinoma of the larynx from tuberculosis in persons over 40 unless a biopsy has been performed. It can usually be differentiated from syphilis, however. Jones says that syphilis is more likely to attack the posterior commissure. The syphilitic lesion is maroon, while the tuberculous lesion is pale. The syphilitic ulcer is punched out, deep

3. Doyle, J. L. C.: Brit. M. J. **2**:1224 (Dec. 26) 1925.
4. Stephani, J.: Schweiz. med. Wchnschr. **13**:289 (April 3) 1926.
5. Jones, Cecil: Iowa State M. J. **15**:529 (Oct. 10) 1925.

and surrounded by a ring of maroon induration, while the tuberculous ulcers are pale, sluggish looking, with irregular edges, shallow and tend to extend along the surface rather than into the depths. Of course, serologic tests must not be neglected, and sometimes a knowledge of the results of these tests is necessary before a definite diagnosis can be made.

Spencer has suggested an ingenious method of diagnosing small or partially hidden ulcers by the application of fluorescein. He sprays the larynx with a mild alkaline antiseptic, which helps to remove the sputum. This is followed by a spray of 10 or 20 per cent solution of fluorescein, which stains the ulcer light green. This should be an effective procedure, especially when there are partially hidden lesions in the interior of the larynx which are difficult to bring into clear view.

Jones, in speaking of the laryngeal complications that may develop in pulmonary tuberculosis, calls attention to the possibility of involvement of the recurrent laryngeal nerve in an apical fibrosis; this possibility, he says, has seldom been mentioned by authors. I have seen two cases of unilateral involvement and one of bilateral involvement which later required tracheotomy. Unfortunately, I was not able to perform a necropsy in any of these cases, so I was not sure whether the paralysis was due to the pressure of enlarged bronchial lymph nodes or to the extension of an apical lesion. While a unilateral paralysis is not of immediate serious import, the possibility of the other nerve also being caught must always be kept in mind, as a quickly performed tracheotomy will then be necessary.

TREATMENT OF LARYNGEAL TUBERCULOSIS

Three methods of treating patients who have laryngeal tuberculosis have attracted a great amount of interest during the last year. Physicians appear to agree that all forms of medication are practically useless as far as stopping the tuberculous process is concerned. In fact, probably more harm than good is done by the usual local medications, as the irritation of swabbing with the production of increased cough tires the patient and is therefore contraindicated in a large number of cases. The three forms of treatment that are being stressed are vocal rest, heliotherapy and the proper use of the galvanocautery.

Rest.—Of course it is recognized that general treatment, best obtained in a sanatorium, is essential in the care of these patients. Jones believes that proper rest in a sanatorium, with a pad and pencil regimen, would bring about an arrest of from 30 to 40 per cent of all laryngeal lesions. I feel that the pad and pencil program is not essential except when the true vocal cords are involved. It must be remembered that coughing produces more unrest and trauma of the larynx than does talking, even over a considerable length of time. In order to secure the

greatest possible local rest, Rodger [6] has suggested the advisability of tracheotomy. I agree with him that one must be prepared to perform a tracheotomy in cases of tuberculous laryngitis when there is obstruction, as one would in any other form of laryngeal obstruction in which the patient cannot breathe freely. However, I cannot agree with him to the extent of believing that the operation might also be wise when the patient is unable to conform to the rule of strict silence. He has operated on five patients, on four for obstruction but only on one for the sole purpose of keeping the larynx quiet. He says that this patient showed some improvement nine weeks after tracheotomy.

Heliotherapy.—There is no doubt that heliotherapy is becoming more popular in the treatment of laryngeal tuberculosis. Various types of apparatus are used, but the majority of physicians insist that the surfaces which reflect the rays of the sun should be made of metal. Dorn [7] calls attention to the fact that the ordinary glass reflector will not transmit the ultraviolet rays, and he questions the results that Dr. Frank Kelner, who still uses the glass mirror, says he secures. Dorno-Davis, quoted by Dorn, who is an expert in physics, says that glass completely absorbs all the ultraviolet rays; he does not understand how any one can obtain good results with the ordinary mirror. Dorn says that in nature we are protected by the earth atmosphere from the infra-red and the ultraviolet rays of the sun, and that if it were not for the filtration by the atmosphere all organic life would be harmed, if not entirely destroyed. But the thought occurs, how can sunlight as we get it be of any use in tuberculosis if the atmosphere filters out all the active rays? On the other hand, Kelner, replying to the criticism of Dorn, says that the rays of the sun are far more important in the treatment of laryngeal tuberculosis than are the artificially developed ultra rays, and also that in using the glass mirror a part of the ultra rays are not absorbed as they are reflected directly from the front surface of the glass. He states further that when sun rays were reflected from a concave mirror greater reactions were obtained than when the rays were reflected from a plain mirror, and that this demonstrates that a large part of the active rays are not absorbed by glass. Kelner also believes that the ultraviolet rays are not the only active factor in the successful irradiation in tuberculous disease.

However, the greater number of those who use heliotherapy successfully stress the importance of metal mirrors for reflecting the sunlight. A popular type of apparatus is the one suggested by Alexander, in which a glass mirror is used by the patient only in order to look into the throat to direct the rays of the sun. This is the apparatus used by Stephani. Among others indorsing heliotherapy is Spencer,[8] who says that "helio-

6. Rodger, T. R.: J. Laryngol. & Otol. **40**:639-645 (Oct.) 1925.
7. Dorn, E.: Ztschr. f. Tuberc. **43**:312, 1925.
8. Spencer, F. R.: J. A. M. A. **87**:216 (July 24) 1926.

therapy offers one of the best methods of treatment, first, because the sun's chemical or actinic rays are curative and, second, because this treatment can be used by the patients themselves and serves as an occupational therapy as well."

Beck [9] reported a case of an advanced lesion in which he asserted that the treatment by the carbon light, as suggested by Wesely in the Vienna Clinic, gave excellent results.

Mullin [10] says that he thinks that heliotherapy in connection with rest is one of the best aids in the treatment of laryngeal tuberculosis.

Debicki [11] has become enthusiastic about the use of the roentgen ray in the treatment of laryngeal tuberculosis. He says that all patients with tuberculosis of the larynx can be treated successfully by this method, that the early lesions practically always heal, and that the lesions even in cases in which there is a great deal of destruction, at times, may be healed completely. He admits that sometimes considerable reaction follows the irradiation, but he says that this should never deter one from continuing the treatment. It is essential that the irradiation be continued for some time after the disappearance of the symptoms. He uses as an optimal dose 5 Holtzknecht units filtered through 4 mm. of aluminum. The irradiation should be applied at each side of the larynx at intervals of one week and repeated several times after from four to six weeks of rest.

I have often wondered why the roentgen ray and radium have not been used more extensively in the treatment of laryngeal tuberculosis. There has been practically nothing in the literature during the last two or three years concerning their use in this disease. In my own experience, which is limited to a comparatively few cases and which dates back about fifteen years, I could not observe any distinctly beneficial effect. I therefore gave up their employment entirely, and used, instead, the galvanocautery. I see no reason, however, why they should not be tried in selected cases, although a good deal of care must be used in their application on account of the violent reaction that sometimes follows, especially in cases in which there are septic processes. The violent reaction that follows its use in the treatment of laryngeal carcinoma is not infrequently so severe as to demand tracheotomy. I had one case in which a comparatively small dose of roentgen ray produced a reaction that caused death five days after its application. This was a case of laryngeal carcinoma with possible perforation of the esophagus. However, it is known that roentgen-ray applications in tuberculous disease of the lymph nodes of the neck frequently cause extensive fibrotic changes. If the roentgen ray tends to bring about fibrosis of tuberculous tissue, theoretically it should exert a beneficial influence on laryngeal lesions.

---

9. Beck, J. C.: Discussion in Spencer (footnote 8).
10. Mullin, W. V.: Discussion in Spencer (footnote 8).
11. Debicki, J.: J. de radiol. et d'electrol. **3**:120 (March) 1926.

Galvanocautery.—Gradually, and especially during the last year, the use of galvanocautery in the treatment of laryngeal tuberculosis is gaining its proper place as the most useful and positive method of treating this disease. In practically every country, there are more and more enthusiastic reports of the results following its proper application. Also, it is being recognized that the action of the cautery is beneficial because it tends to promote the formation of scar tissue and not because of actual destruction of the diseased area or the tubercle bacilli. De Reynier [12] has reported a number of cases in which excellent results were secured, among them a case of tuberculosis of the tongue which had existed for four years before the patient had been treated. This author made another interesting observation, that in syphilitic gumma of the larynx the cautery seemed to have a similar beneficial action; the swelling disappears almost entirely after one treatment. He is rather ingenious as to his theory concerning the action of the cautery, believing that it attracts an increased number of leukocytes which become actively phagocytic against the tubercle bacilli, and that perhaps the action of the heat on the adjacent healthy cells may in some way stimulate them to the production of antibodies. This theory seems rather fantastic, although it shows that de Reynier realizes that the beneficial action is not dependent on the destruction of the tissue by cauterization. As far as is known, and it has been shown by some experimental research, the eschar produced by the burning is thrown off by a zone of granulation tissue, and the formation of this zone of granulation tissue makes necessary the revascularization of a previously bloodless tissue. This revascularization of necessity increases the supply of nutrition, and this increased nutrition is vital for the healing of the tuberculous area. Spencer [8] says, "The object of using the cautery is to produce fibrosis and not to destroy the tubercles at the time. Total destruction is unnecessary and is too radical to yield the best results in an organ as delicate as the larynx." He further says, "The cautery is the best single method of treatment we have to date. Its value cannot be disputed."

Hirsch,[13] in speaking of the surgical treatment of laryngeal tuberculosis, says that the bloody or cutting method may be used in hypertrophic forms and in those associated with marked infiltration. He admits that serious hemorrhage sometimes occurs, which, however, can be controlled by proper technic. He prefers the bloodless methods, which consist chiefly of galvanocautery and diathermy. He says that galvanocautery can be used to advantage in all types of laryngeal tuberculosis, from the smallest nodule to the large infiltrations and ulcers, but that an attempt to destroy all the diseased tissue should not be made; one aims only to cause the formation of scar tissue. Hirsch is still more

12. De Reynier, L.: Presse med. **34**:310 (March) 1923.
13. Hirsch, Caesar: München. med. Wchnschr. **72**:934 (June 5) 1925.

enthusiastic concerning the action of diathermy or electrocoagulation, which, he says, has an even greater tendency to form scar tissue than cauterization, because its action extends more deeply into the tissues. He has invented an apparatus in which the point can be placed, while cold, under exact control of the eye so that every phase of the operation is easily controlled. There is no smoke, which is sometimes present when the cautery is used, and the application is never followed by bleeding, which sometimes follows the use of the cautery if the knife is not withdrawn while still hot. He has seen severe edema follow the use of both cauterization and diathermy; he therefore believes that this operation should be performed in the hospital in case tracheotomy should prove necessary.

In reference to bleeding following cauterization, I had never experienced any difficulty until about a year ago. This occurred in a patient in whom the epiglottis had been partly removed and the stump had almost healed. When a small bit of granulation tissue on the stump was cauterized, there was a sudden gush of blood so severe that it was almost impossible to see where it was coming from; it looked as though the patient might die before he could be taken to the hospital. I was fortunate, however, in being able to strike the bleeding area with the cautery through the pool of blood, thus partially checking the hemorrhage. I then found the bleeding spot to be a fairly large artery running through the epiglottis. Bleeding was finally completely checked with a chromic acid bead. However, as a rule when the cautery is properly applied there is no bleeding; the bleeding is slight and unimportant even when, either through faulty technic or movements of the patient, the cautery is pulled while cold from the spot being cauterized. I cannot agree with Hirsch, who says that cauterization should be performed only in the hospital. With the exception of the one instance noted in the foregoing, I have never seen any serious edema or other complication following its use.

The only criticism I have found against the use of the cautery in laryngeal tuberculosis is that of Swetlow [14] in his article on the injection of the superior laryngeal nerve with alcohol. He quotes Fishburg [15] as saying that the use of the galvanocautery and curettage of the tuberculous larynx had ended disastrously in all of his cases. If Swetlow really believes this statement of Fishburg, he either has not had much experience with the use of the cautery or has not learned the proper technic.

Technic of Anesthesia.—Spencer has made a few suggestions concerning the technic of anesthesia. He usually precedes the operation by the hypodermic administration of morphine, from one-fifth to one-

14. Swetlow, G. I.: Am. Rev. Tuberc. **12**:189 (Nov.) 1925.
15. Fishburg: Pulmonary Tuberculosis, vol. 8, p. 64.

fourth grain (0.012 to 0.016 Gm.), one hour before the time set for the operation. He uses a 10 per cent solution applied by means of the Bruenings' laryngeal syringe. There is a straight cannula for direct and a curved cannula for indirect administration. The cannulas are perforated in several places near the tip and at the tip. The ends are milled so that they can be wrapped with cotton. Every few minutes several drops of the freshly prepared solution can be forced from the syringe through the cannula and into the cotton for additional applications to the larynx. He says that from fifteen to twenty minutes can be spent profitably in producing anesthesia, and that the cautery should not be applied until from fifteen to twenty minutes after the last application. There is no doubt that this method of Spencer's is efficient, but too much time is spent in producing anesthesia. If 2 grains (0.13 Gm.) of powdered cocaine is placed in a watch crystal and an ordinary cotton swab soaked with water is rubbed into this powder, an approximate saturate solution is obtained which when carried into the larynx will produce sufficient anesthesia within five minutes in the majority of cases. Usually, a second application is necessary, but on the second swab only the remains of the original 2 grains of cocaine should be used. More than fifteen minutes is seldom required for the giving of the anesthesia and the cauterization of the larynx by this method.

Amputation of Epiglottis.—Spencer thinks that the amputation of the epiglottis in carefully selected cases may give gratifying relief, but that it must be done reasonably early if any real good is to be accomplished. On the other hand, Swetlow believes that the operation causes too high a mortality to warrant its use, and Mullen, in a comment on Spencer's article, says that he never secured good results from the removal of the epiglottis, and that he has ceased using this procedure.

It is not doubted that in certain selected cases removal of the epiglottis is indicated, but I believe that these are cases in which there is extensive involvement of the epiglottis but with little extension into the aryepiglottic folds. The early lesions of the epiglottis can almost always be healed promptly by the use of the cautery. The use of the cautery snare is undoubtedly the best method of removing the epiglottis; if a sharp cutting instrument is used, the stump should be seared thoroughly with the cautery afterward.

Injection of Superior Laryngeal Nerve.—The injection of the superior laryngeal nerve is an important procedure in late cases of laryngeal tuberculosis. The relief from pain that follows is so positive that the remote possibility of inspiration pneumonia on account of the subsequent lack of sensitiveness of the larynx may almost be ignored; but on account of this possibility it would seem that the nerve should be injected only in those patients in whom pain is the predominating symptom and in whom proper local treatment apparently is hopeless.

Swetlow, however, is enthusiastic and believes that blocking of the nerve with alcohol should be done much more frequently than it has been. Mullen apparently agees with him; however, as Spencer says, "Injection of the superior laryngeal nerve is of benefit in relieving pain but it is not a cure." Also, it must be remembered that only those portions of the larynx reached by the superior laryngeal nerve are affected, and that a great many of the painful areas in laryngeal tuberculosis are extrinsic and are supplied by the glossopharyngeal nerve.

Swetlow's technic is as follows: A rolled sheet is placed under the shoulders so as to stretch the front of the neck moderately. The great cornu of the hyoid bone is made more prominent by pressing on the great horn on the opposite side. The needle point is inserted 2 cm. in front of the large horn of the hyoid and 1 cm. below it. It is pushed backward and slightly upward toward the great horn, but not permitted to go beyond a line running from the large horn of the hyoid to the posterior edge of the thyroid cartilage. Beyond this line are the large blood vessels. The needle is inserted for about 1.5 cm.; then the point should lodge between the thyrohyoid muscle and the thyrohyoid membrane. If the nerve is not struck immediately, the point of the needle should be used as a probe over the entire thyrohyoid area. When the nerve is struck the patient experiences a sharp pain in the ear on that side. Swetlow uses a 1 per cent cocaine hydrochloride solution in 80 per cent alcohol solution. As it is imperative to strike the nerve before injecting, the needle should be inserted before the syringe is attached to it.

Gastrostomy.—Brown [16] of Denver says that at the sanatorium at which he is a member of the staff gastrostomy is practiced in cases of severe dysphagia in order to keep up nutrition. They have performed the operation seven times. One patient lived only a few hours; several lived for months, and one patient for more than a year. By gastrostomy these patients obtain absolute rest of the larynx.

It is possible that in certain hopeless cases gastrostomy will be of great comfort to the patients as it makes it possible to avoid swallowing, which sometimes is severe torture, but I cannot agree with Brown when he says, "If we are going to do these patients the greatest good, we should do the gastrostomy early and not wait until there is extensive ulceration of the epiglottis and arytenoids."

16. Brown, M. D.: Discussion in Spencer (footnote 8).

News and Comment

NATIONAL SOCIETY MEETINGS

The American Ophthalmological Society will hold its next annual session in Quebec, Canada, June 27-29, 1927. President, Dr. William Zentmayer, 1506 Spruce St., Philadelphia; secretary, Dr. Emory Hill, Professional Bldg., Richmond, Va.

The American Academy of Ophthalmology and Oto-Laryngology will hold its next annual session in Detroit, September 12-16, 1927. President, Dr. Edward C. Ellett, Exchange Bldg., Memphis, Tenn; secretary, Dr. L. C. Peter, 1529 Spruce St., Philadelphia.

LOCAL SOCIETY MEETINGS

COLORADO: The Colorado Oto-Laryngological Society meets on the first Saturday of the month from October to May, at the Assembly Room of the Metropolitan Building. President, Dr. David A. Strickler; secretary, Dr. C. Howard Darrow, Metropolitan Building, Denver.

ILLINOIS: The Chicago Laryngological and Otological Society meets at 6 p. m. on the first Monday of the month from October to May, in the Grill Room, Stevens Restaurant, 16 N. Wabash Ave. President, Dr. Arthur M. Corwin; secretary, Dr. Austin A. Hayden, 25 E. Washington St.

MARYLAND: The Section on Otology and Laryngology of the Baltimore City Medical Society meets at 8:30 p. m. on the last Friday of each month, at 1211 Cathedral St. Chairman, Dr. Edward A. Looper; secretary, Dr. Edwin N. Broyles, 1100 N. Charles St.

MISSOURI: The Kansas City Eye, Ear and Nose Society meets the third Thursday of each month from September to May. The November, January and March meetings are devoted to clinical work. President, Dr. Joseph W. Kimberlin; secretary, Dr. A. E. Eubank, 636 Argyle Bldg.

NEW YORK: The Section on Laryngology and Rhinology of the New York Academy of Medicine meets at 8:30 p. m. on the fourth Wednesday of the month from October to May, at 17 W. 43d St. Chairman, Dr. John E. Welch; secretary, Dr. Arthur Nilsen, 40 E. 41st St.

The Otological Section of New York Academy of Medicine meets on the second Friday of each month from October to May, at 103d St. and Fifth Ave. Chairman, Dr. J. L. Maybaum; secretary, Dr. R. T. Atkins, 4 W. 53d St.

OHIO: The Ophthalmological and Otolaryngological Section of the Cleveland Academy of Medicine meets on the fourth Friday of each month at the Winton Hotel. Chairman, Dr. E. W. Garrett; secretary, Dr. M. Paul Motto, Rose Building.

PENNSYLVANIA: The Section on Otology and Laryngology of the College of Physicians of Philadelphia meets at 8:30 p. m. on the third Wednesday of each month from October to June, at the College of Physicians. Chairman, Dr. Fielding O. Lewis; clerk, Dr. James A. Babbitt, 1912 Spruce St.

WISCONSIN: The Milwaukee Oto-Ophthalmic Society meets at 6:30 p. m. on the third Tuesday of the month, at the University Club. President, Dr. Charles J. Coffey; secretary-treasurer, Dr. Edward R. Ryan, 425 E. Water St.

Abstracts from Current Literature

Ear

DIPHTHERIA OF THE WOUND IN AURAL SURGERY. LEONARD SEIFERTH, Ztschr. f. Hals-, Nasen- u. Ohrenh. **14**:519 (June 12) 1926.

Seiferth reports two cases of his own and refers to others. The course of diphtheria of the wound can vary considerably. In the great majority of cases the complication is harmless. At times, postdiphtheritic paralyses are observed (paralysis of the soft palate and paralysis of accommodation). Polyneuritis has also been recorded. Twenty-one patients have died since 1918. If the general condition of the patient is not particularly affected, and if no alarming symptoms occur (high fever, paralyses), the diphtheria of the wound must be regarded as a local condition, and the prognosis is favorable. If it shows the disease picture as it presents itself in a diphtheritic affection of the throat, it must be considered a general disease. In the first instance the ordinary antiseptics can be used in the wound, or antidiphtheritic dry serum can be sprinkled on the wound. The use of iodoglycerine, which was used with success in nasal diphtheria, proved to be successful in one of the author's cases when applied to the wound daily. In grave conditions, however, antidiphtheritic serum must be injected in addition to the use of local therapy. During the last few years, the variability of diphtheria bacilli has been investigated. Von Bernhardt and Paneth transformed diphtheria bacilli by cultivation; Jacobsthal cultivated various types from the blood of a cadaver. If investigation will solve this problem, more can be learned about the multiformity of diphtheria.

THE PATHOLOGY OF THE OTOLITH APPARATUS. N. A. POPOW and D. M. RUTENBURG, Ztschr. f. Hals-, Nasen- u. Ohrenh. **14**:530 (June 12) 1926.

A number of authors have advanced theories concerning caloric nystagmus. Bartels claims that cold paralyzes and that heat irritates the whole labyrinth. Kobrak thinks that caloric nystagmus is caused by irritation of the vessels by heat and cold. Borries considers it a reaction of the otolith apparatus, whereas Mygind thinks that it is created by the otolith apparatus and by the semicircular canals simultaneously. Of all these theories, Kobrak's theory has been accepted to some extent, although Grahe has proved beyond a doubt that Kobrak's theory cannot explain all peculiarities of caloric nystagmus. Mygind has tried to explain that the fistula symptom is caused by change of pressure in the labyrinth, and as the otolith apparatus is influenced by change of pressure in the labyrinth (Ouix, Magnus and his pupils), he concludes that the fistula symptom is a reaction of the otolith apparatus to a specific irritation, namely, change of pressure.

The authors report a case in point. The paradox fistula symptom did not exist before operation. A circumscribed labyrinthitis was present. A radical operation was performed Oct. 11, 1924, and its indication was based on the following symptoms: Some hearing remained. The vestibulary apparatus did not function and the equilibrium was disturbed. The subjective symptoms had increased; dizziness, nausea, vomiting and headache were present. The temperature was subnormal and the paresis of the left facial nerve had increased. The drum membrane was missing; granulations were present in

the tympanic cavity and the discharge was offensive. There was pain in the region of the mastoid process. The horizontal semicircular canal did not show any pathologic changes. March 3, 1925, it was noticed that a slight pressure on the left side of the tragus elicited severe vertigo and nausea; the bulbus deviated to the right and the lower pole upward and outward to the side of pressure. The slow component of the rotary nystagmus was to the left. Rarefaction of air did not elicit a fistula symptom. Neither turning nor caloric nystagmus could be elicited on the left side. When the head was turned, the same vestibulary sensations appeared as described when pressure was exercised on the tragus. When the body was immobilized and the head was turned to the right to its maximum position (the left labyrinth upward), verticodiagonal nystagmus and nausea appeared. When the head was immobilized, deviations of the trunk to both sides also elicited nystagmus to both sides, which was more pronounced when the trunk deviated to the left. When the patient was sitting quietly with her eyes closed, the whole trunk deviated in the bitemporal plane to the left from the medial sagittal plane with the appearance of subjective symptoms and loss of equilibrium. It must be assumed that the nystagmus and the subjective symptoms with immobilized trunk and maximal turning of the head to the right (the diseased labyrinth upward) agree with the view of Magnus that the sensory cells of the macula acustica are not irritated by pressure, but by the hanging down of the otolith crystals.

When the pressure of the lapilli, otoliths in the utricle, increases, the neck, the trunk and the extremities become more flexed (position of flexion); when the pressure decreases, the neck, the trunk and the extremities become more extended (extended position). When the head does not move in the relation to the body, but if the body moves in relation to the immobilized head, the irritation of the otoliths can elicit reverse tonus corelations.

Sagittae Reflexes.—(*a*) Concerning the eyes: Sagittae (otoliths in the saccule) give to the eyes the position in the frontal plane. When the pressure of one sagitta increases whereas the pressure of the second decreases or remains unchanged, the eyes take a new position by turning of the sagittal axis with the upper pole to the sagitta, the pressure of which increases. If, however, the pressure of one sagitta decreases whereas the pressure of the second increases or remains unchanged, the eyes take a new position by turning around the sagittal axis with the lower pole to the side of the sagitta, the pressure of which decreases (the paradox fistula symptom of the authors). (*b*) Concerning the muscles which turn the neck and the trunk, and the abductors and adductors of the extremities: The sagittae furnish the position in the frontal (bitemporal) plane for the head, trunk and extremities. If the pressure of a sagitta increases, and the pressure of the other decreases or is not changed, the head and trunk take a new position by deviation from the sagittal axis to the sagitta, which presses less or not at all (spontaneous deviation to the left in the bitemporal plane in the authors' patient).

The extremities on the side on which the pressure has increased were abducted, and the extremities on the other side were adducted (conjugate deviation of both arms in the authors' patient).

Combinations of irritations of otoliths which are too strong or not physiologic (either of the lapilli or of the sagittae) extend to the region of the vagus and sympathicus. They express themselves in movement of the stomach, vasomotor symptoms, disturbances of the cardiac function, etc. (subjective symptoms in the authors' patient).

The complicated complex of symptoms in the authors' patient can be rather consistently explained by following the views of Magnus and Ouix: A circumscribed labyrinthitis was present which affected the cochlea and the vestibulary apparatus, especially the portion which regulates the kinetic sense (semicircular canals), and also that portion which regulates the static sense (otoliths) especially of the sagitta system (Ouix).

THE PARTIAL LABYRINTH RESECTION OF O. VOSS. W. UFFENORDE, Ztschr. f. Hals-, Nasen- u. Ohrenh. **14**:542 (June 12) 1926.

Uffenorde discusses an article by Voss in the *Zeitschrift für Hals-, Nasen- und Ohrenheilkunde* volume 14, page 297. Voss claimed that in otogenous meningitis an examination of the labyrinth and a decision concerning the path of infection frequently are impossible. "The functional test could therefore not be used as an indication for the proposed labyrinth operation and its extent." In inflammation behind the labyrinth, a "partial resection" would have to be performed if meningitis developed from that locality. The intracranial focus of pus should be eradicated. It would be useless to open the cochlea if the meningitis developed from the vestibulary portion, and if a part of the hearing was present. Uffenorde bases the following conclusions on several cases which are described and criticized in detail.

1. When the inflammation enters the endocranium from a perilabyrinthian focus, the following course should be taken: If a deep extradural or cerebellar abscess develops and the labyrinth can be irritated caloricallly and hearing is preserved, the labyrinth should not be touched if possible. The endocranial process should be laid bare and drained. Only when conditions as to space are unfavorable and the diseased portion is situated toward the middle should the removal of the vestibular labyrinth perhaps be considered in order to secure good drainage.

2. If, however, a perilabyrinthian inflammation leads to meningitis, and the labyrinth itself is not diseased, the decision is more difficult. The question is not whether a healthy inner ear shall be sacrificed in a nonlabyrinthian meningitis, but that the amount of space should be considered. Frequently sufficient drainage can be established only by enlargement of Trautmann's space. Uffenorde was able to remove a sequestered tip of the pyramid only by resection of the labyrinth. In virulent infections one would also consider the labyrinth operation in order to procure efficient drainage by an approach to the inner meatus.

3. The perilabyrinthian inflammation may progress to the labyrinth and then to the endocranium. If only the vestibulary portion is diseased and the endocranium is free from infection, the partial operation, according to Jansen and Neumann, is indicated. The patient referred to in case 4, *Handbuch der Speziellen Chirurgie,* volume 2, page 745, did not lose the sense of hearing in spite of a partial labyrinth operation. This was shown seven years after the operation. The perilabyrinthian foci which are situated more at the floor of the pyramid or posteriorly and inferiorly are inclined to penetrate into the cranial cavity rather than into the labyrinth.

4. It must be considered that a perilabyrinthian focus may cause simultaneously a complication of the labyrinth and of the cranial cavity. The radical operation is performed on patients with a middle ear suppuration with perilabyrinthian foci and their complications if the condition becomes progres-

sive either toward the labyrinth or toward the endocranium. If this is not successful, further steps become necessary.

Patients with perilabyrinthian foci should receive special consideration. Besides the middle ear cavities, a more or less defined region must be treated. It is true that this region belongs to the middle ear, but it furnishes the connecting link between the middle ear and the subsequently infected parts. In inflammation of the labyrinth after cholesteatomatous suppuration, which is confined to the labyrinth, the exposure of the lateral labyrinthian capsule is sufficient. Operation on the labyrinth must also be performed if the process emanates from the hidden perilabyrinthian foci. Only the more laterally situated retrolabyrinthian foci can be reached by an extended opening of the middle ear cavities.

The region which must be considered in surgical treatment of the labyrinth is too extensive and too complicated for general directions to be given concerning this method. The results of pathologic anatomic investigation and of clinical examination, however, are sufficient to guide one if surgical exposure of the middle ear cavities is resorted to in order to detect the pathway.

EMPYEMA: WARNING CONCERNING THE TERM "MASTOIDITIS." A. SCHEIBE, Ztschr. f. Hals-, Nasen- u. Ohrenh. **14**:555 (June 12) 1926.

Scheibe expresses satisfaction that an investigator like Krainz has taken up with Scheibe's "Etiology and Pathogenesis of Empyema," and that Krainz has excelled in reliable investigations of bone histology. It is, however, not quite correct to assume that the covering of the mastoid cells is not a mucous membrane but endosteum. He should have prefixed the word "ordinary" before "mucous membrane." It is true that the covering is anatomically different from the nasal mucous membrane, for instance, because it possesses scarcely any glands; but it is a direct continuation of the mucous membrane of the nasopharynx, and clinical experience teaches that it forms mucus and mucopus, respectively, when inflamed. The epithelium produces mucus when inflamed. Therefore it is a mucous membrane but not an ordinary one. Krainz's method is different from Scheibe's method. For this reason Krainz denies the existence of Scheibe's disease picture of empyema. During the course of an acute middle ear suppuration there are two kinds of destruction of the bone macroscopically visible—first, necrosis, and second, bone fusion. Scheibe came to the conclusion that the necrosis is not caused by local conditions, but mainly by an exhaustion of the general organism. Scheibe chose the term bone fusion because nothing remains of the destroyed osseous substance and because it is totally resolved, in contrast to necrosis. Krainz, however, is correct in saying that this term supposes a change of consistency in the contiguous regions. This does not occur when the osteoclasts are in action. It would be better to substitute osteoporosis, bone atrophy, resorption, decomposition, arrosion or rarefaction for the term "bone fusion." Scheibe emphasizes the necessity of observing meticulously the rules for correctly removing the pieces of bone around a fistula for histologic examination. During twelve years, he chose only thirteen or fourteen out of hundreds of cases.

Krainz uses the term "mastoiditis," but does not consider the anatomic or etiologic point of view. He considers indication for operation as based on discharge lasting longer than five weeks, combined with continuous pain behind the ear and tenderness or swelling of the external soft parts, and symptoms of the labyrinth and brain. Krainz does not mention the two most

important symptoms of empyema, namely, throbbing and the lack of transparency of the drum membrane lasting for two weeks or longer, after the onset of otitis media. The presence of other symptoms is not absolutely necessary for the diagnosis, although it is necessary for the localization, prognosis and indication for operation. One symptom is a great deal of creamy, seldom hemorrhagic pus, which fills the lumen of the meatus; the quantity changes, and the specific gravity is high (Forselles). A nipple-like perforation is present, and tenderness appears later. The temperature is subfebrile. Repeated roentgenograms show an excentric enlargement of a cell. With the same surgeon, "mastoiditis" comprises various disease pictures. Besides empyema and necrosis, a third type exists which still needs investigation. It is characterized by a propagation without a fistula, and without macroscopically visible necrosis. Krainz, contrary to Scheibe, does not pay any attention to the border of the fistula. Krainz examined only the cells near or remote from the empyema cell. Scheibe states that retention of pus and fistula formation in the cortex are not caused by the smallness or unfavorable position of the perforation of the drum membrane, but by the absolute or relative occlusion of some single pneumatic cells in consequence of a pronounced inflammatory swelling of the mucous membrane. If spontaneously or under conservative treatment the swelling of the mucous membrane decreases, normal ventilation, pressure and resorption occur, a bone fistula develops in about two weeks, either in the wall of the temporal bone or inwardly, either into the cranial cavity or into the labyrinth. This occurs in more than one third of the cases. The conservative treatment consists of physical and mental rest, avoidance of alcoholic drinks, elevated position of the head at night and during the day, air douche, icebag and boric acid treatment if a discharge is present. The same kind of microbes is found in empyema as is found in the original middle ear suppuration. In constitutions with great resistance, encapsulated cocci are found more frequently. In consuming general diseases, *Streptococcus pyogenes* is present more frequently. *Streptococcus mucosus* seems to lead relatively more frequently to empyema. Could it develop from other varieties of streptococcus, especially in constitutions which react strongly and lead more frequently to an occlusion of the ostia of the cells on account of the especially strong reaction of the mucous membrane? After a broad opening of the empyema cavity, it never extends excentrically. If the body is resistant and the patient does not succumb to the sequelae of the empyema (1 per cent of the patients coming early under treatment), a clinical cure results quickly. After-treatment without packing and without drainage, after closing the largest portion of the upper portion of the soft parts, results in closure of the wound in a few days, and after about nineteen days the hearing reaches the previously existing condition. In 16 per cent of the cases no discharge from the tympanic cavity was found. As the bone destruction ceases immediately after the evacuation of pus, it cannot be called "caries."

In children, the fistula develops more quickly and becomes larger than in adults. In the course of general diseases, the clinical picture of empyema is different. In these dyscrasic forms, in contrast to the previously described eucrasic form, the mucous membrane of the cells is less swollen and usually not granulating. In spots it even has disappeared; the denuded bone is of a whitish discoloration and is sometimes thrown off as a sequestrum. In cases in which the mucous membrane of the whole cell is necrotic, for instance in phthisis, empyema does not develop. The characteristic point is the slight reaction. Histologic examination showed that the soft covering of the cavity to which the fistula leads can be thickened up to eighty times its normal thick-

ness. In all cases epithelium was present. Only parts of epithelium were found as tubes within the thickened mucous membrane, while it was mostly missing on the surface. In no case did the fistula lead into the marrow spaces. (Only rarely was a long, fine fistula channel found which led into an extradural and once into a burrowing abscess.) Not only the soft lining of the cells but also the adjacent marrow was highly inflamed. The bony wall of the empyema cell was always covered by lacunae. No spot of the wall had remained smooth. In a portion of the surrounding marrow spaces, no smooth spot was visible. The bone destruction is caused by osteoclasts in the lacunae without previous softening of the osseous substance. The empyema per se does not cause any pain. A third kind of bone atrophy might be assumed when the bone contains Sharpey's fibers. In the cortex, and especially in the tip, a peculiar change of the bone was found which Scheibe called a "spongy change." One week after evacuation of pus, the granulating mucous membrane had partly changed into connective tissue. Most of the osteoclasts had disappeared. The lacunae were covered with osteoblasts instead of with osteoclasts. In strong subjects they can be covered with an osteoid substance after a few days. If an empyema is created during a consuming general disease (influenza, diabetes, measles, etc.), the thickening of the mucous membrane is less pronounced. It is sometimes only about tenfold. The activity of the osteoclasts continues longer in general diseases. Resorption of the osseous basic substance continues under a pressure at which apposition takes place in a resistant body. In a nonresistant organism, less pressure is necessary for a fusion of the osseous substance than in a resistant body. It seems that, at times, formation of lacunae can occur without pressure and with free outflow, especially in the dyscrasic type. The osteoclasts alone work more quickly and longer in the exhausted organism. Finally, the suppuration ceases during general diseases; only in grave and progressive exhaustion, for example, in scarlet fever, diphtheria or tuberculosis, suppuration may continue, and even necrosis may occur at the wall of the empyema cell.

Scheibe's investigation shows that rarefying osteitis or inflammatory osteoporosis leads to a fistula formation. The bone destruction is secondary. The primary condition is the empyema, the absolute or relative occlusion of the neck of a suppurative cell by its reactively swollen lining, which causes retention of pus and hyperpressure. The hyperpressure is the deciding factor. Its long duration may lead to formation of a fistula. The occlusion of the exit probably leads not only to simple mechanical retention of pus, but also to rarefaction of air, hyperemia ex vacuo and increase of suppuration. The bone destruction in empyema is a teleologic process. It serves the evacuation of pus, even if it is evacuated into the cranial cavity and into the labyrinth.

Krainz claims that "mastoiditis" begins with destruction of the bone in the marrow spaces and vessel channels, but not in the pneumatic cells, and that the empyema is not the cause and origin but only an accompanying occurrence of "mastoiditis." He found apposition of bone in 80 per cent of his cases. Scheibe found osteoblasts in 100 per cent. Bone apposition has nothing to do with bone destruction. Krainz thinks that the main condition is the changes in the marrow spaces. Scheibe opens only the empyema cell and not the adjacent marrow spaces. He avoids them as much as possible, also the remainder of the cells, especially those in the antrum, because they are clinically and pathologically entirely different and are still ventilated, as the air bubbles prove. Although he acts contrary to almost all otologists, Scheibe claims that the results justify his method. The average healing time until

the hearing is normal is nineteen days; scar recurrences appear in 3 per cent of the cases, and 0.55 per cent of the patients died (Mueller). Scheibe discusses critically Krainz's misconception of the rôle which Sharpey's fibers play in pathologic changes in the temporal bone.

The author considers throbbing an important symptom in mastoiditis, although it is not so important during the first week when it may be caused by an empyema of the tympanic cavity. Soft bone on the wall of the cells is not softened old bone, but newly formed young bone. The fat cells of the marrow near the empyema cell disappear. The osteoblasts probably develop from osteoclasts. What is mastoiditis? Concerning marrow tissue, it must be stated that a typical osteomyelitis of the temporal bone (Schilling) is a rare disease. Scheibe has never seen a case, but does not doubt that it can occur. It can, however, be assumed that in each case of uncomplicated otitis media, the marrow tissue adjacent to the mucous membrane participates in the inflammation of the mucous membrane of the periosteum. Tenderness in otitis media can be produced by inflammation of the osteoblastic layer of the periosteum alone. Inflammation of the lining of the cells of the mastoid process is shown by Bezold to exist in each case of otitis media (necropsy reports), even if it remains latent, for instance, in measles. Politzer has observed this. Scheibe notes three disease pictures which are called "mastoiditis:" (1) empyema, (2) necrosis and (3) otitis media without demarcation. In the latter instance, probably a preliminary stage of necrosis is present. Therefore Scheibe decries the term "mastoiditis." Krainz's term "endostitis mastoidea" is not correct. Furthermore, the same process which is found in the mastoid process can also occur in the petrosal part and next to the eustachian tube, or to the tympanic cavity, and here the name "mastoiditis" cannot be used.

AMBERG, Detroit.

IS THERE AN ENDOCRINE FACTOR IN OTOSCLEROSIS? HAROLD L. WARWICK and HOMER M. STEVENSON, Acta oto-laryng. **9**:317, 1926.

These authors raise the question as to whether a change in calcium metabolism due to endocrine disturbance may not be the cause of the formation of new bone in otosclerosis. The anterior lobe of the pituitary and the thyroid gland control calcium metabolism. The ovarian secretion inhibits both the thyroid and pituitary, and thus indirectly influences calcium metabolism. In pregnancy, the action of the ovary is depressed and its inhibitory action is removed. Hence the acromegaly of pregnancy. Hypertrophy of the pituitary occurs in pregnancy. Thus when the ovaries are depressed there results a secondary hyperfunctioning of the pituitary and an increased calcium assimilation.

Osteomalacia of pregnancy occurs when the supply of calcium needed for increased calcium metabolism is insufficient. The bony skeleton is called on to yield calcium. The osteomalacia and otosclerosis are alike in many respects. After pregnancy, when the need for much calcium has been removed, the hyperfunctioning pituitary keeps the calcium at a high level for weeks. Most of the excess is excreted but some may be deposited, as in otosclerosis. Otosclerosis becomes worse with each pregnancy. Calcium deposits are prone to occur in cartilage. Embryonic islands of cartilage occur in the footplate of the stapes and about the fenestra ovalis, the point of election of otosclerosis. It seems reasonable to the authors to suppose that the high level of blood calcium during pregnancy, due to the uninhibited action of the thyroid and the pituitary, may result in new bone formation in the embryonic cartilage islands in the labyrinthine capsule.

SOME ADDITIONAL CASES OF VESTIBULAR DISTURBANCE. C. O. NYLEN, Acta otolaryng. **9**:325, 1926.

The author reports sixteen additional cases of vertigo dependent on the position of the head. Five were due to peripheral and eleven to central disorders. Cases 1 and 2 were due to inflammation in the middle ear; cases 3 and 4 to degenerative changes and case 5 was toxic (cocaine).

In the second group, cases 9 to 16 were found in connection with brain tumors, whereas case 6 was due to arteriosclerosis, case 7 to cerebral syphilis and case 8 to multiple sclerosis.

In five, nystagmus was present only when the head was inclined backward and somewhat to the side (the position, according to Borries, in which the labyrinth receives its greatest stimulation). The others all showed a nystagmus when the head was in a forward position, when it was turned to one side or the other or when it was inclined backward. It appeared more often with the head toward the side and was usually horizontal-rotatory. The central lesions often showed a vertical nystagmus.

Past pointing was not marked in any subject. When it appeared, it was found to be greatest in the positions causing the highest intensity of nystagmus. The falling reaction was irregular, but in the cases of peripheral lesions tended to be in the opposite direction from the nystagmus. Four subjects carried the head in a fixed position and developed vertigo when this was changed. The position assumed was: the face turned away from and the head bent toward the side of the lesion. This occurred in certain cases of brain tumor. The caloric reaction was normal in ten cases, reduced in some but absent in only one case.

Seven subjects were rotated; four gave normal reactions. Two patients with cerebellar tumor failed to show reactions from the side of the tumor. The patient with multiple sclerosis reacted only in certain positions. In general, a subjective sensation of vertigo developed in the positions showing nystagmus. One patient with a vertical nystagmus downward complained of feeling as if he were flying upward. He grasped objects in order to keep himself "down on the earth."

The hearing was reduced in the five patients with peripheral lesions on account of local conditions. With three exceptions, the hearing was not greatly decreased in the other subjects.

ANDERSON, Duluth.

Nose

PARANASAL SINUSITIS IN INFANTS AND IN YOUNG CHILDREN. PHILIP C. JEANS, Am. J. Dis. Child. **32**:40 (July) 1926.

It is a well recognized fact that a large part of the work of the pediatrician concerns conditions which depend on infection in the upper respiratory tract. The rôle of the lymphoid tissue in the nasopharynx in this respect has long been recognized, but that of the paranasal sinuses is of more recent knowledge. The importance of sinusitis in infancy and childhood is not concurred in by all observers. This may be due to the feeling on the part of some that, as it is a new idea, it is being overemphasized, and also to the fact that sinusitis is more prevalent in some sections of the country than in others. However, reports from various observers would seem to indicate that it does frequently assume a rôle of great importance.

A great many diseases may be caused by sinusitis in infancy and childhood, almost every type of disturbance due to focal infection being found. The author mentions in more detail several conditions found recently at the University of Iowa Medical School. Infants have been observed who suddenly developed symptoms of "cholera infantum" with diarrhea, fever, intoxication, dehydration and marked loss of weight, and in whom the condition was dependent on infection of the paranasal sinuses, clearing rapidly after drainage of the sinuses. The author points out that the same type of gastro-intestinal upset has been observed in cases of so-called "masked mastoiditis." Cases are reported of parenchymatous nephritis due to staphylococcus infection, caused apparently by a paranasal sinus infection as drainage of the infected sinus cleared up the condition. Hemorrhagic nephritis apparently is dependent on streptococcic infection, and a case is reported in which recovery followed promptly on resolution of the sinus condition. Headache and asthma are also mentioned as conditions clearing up after such infections.

RELATION OF PARANASAL SINUS INFECTION TO DISEASE OF THE LOWER RESPIRATORY TRACT. W. V. MULLIN, J. A. M. A. **87**:739 (Sept. 4) 1926.

Mullin, together with Ryder, has endeavored to work out the channels of lymph drainage from the nasal sinuses in an effort to explain the relationship between paranasal sinus disease and lower respiratory infection. Rabbits were used for the investigation of the maxillary sinus and cats for the investigation of the frontal sinus. India ink and emulsions of tubercle bacilli were injected into the sinuses, and at necropsy the glands and lymph paths followed by these injected substances were investigated. The authors found that the lymphatic absorption from the nasal sinuses is by way of the submaxillary and internal jugular nodes, the lymph ducts, the great veins, the right side of the heart and the lungs. The bronchial and mediastinal glands are also involved, but not the faucial tonsils. The most important of the lymph glands involved in this absorption are the submaxillary, the internal jugular and the carotids, the latter corresponding to the entire chain of deep cervical nodes in man, including the retropharyngeal. Infectious material from the sinuses may drain into the so-called tonsillar gland lying beneath the posterior belly of the digastric muscle, and enlargement of this gland after tonsillectomy may be significant of sinusitis. The authors give in detail the anatomy of three systems of bronchial and mediastinal glands, designated as the peritracheobronchial, the intertracheobronchial and the interbronchial glands, and state that infection and resultant enlargement of these glands may produce cough and pressure on important pulmonary structures with resultant retention of secretion.

Infection of the nasal sinuses is described as occurring in four different types: acute inflammatory, acute purulent, chronic purulent and chronic hyperplastic. The hyperplastic type of disease is the most important in the causation of chronic chest infections. The mucous membrane becomes thickened and boggy and may show polypoid degeneration. There is blocked drainage from all sinuses, with absorption of bacteria and bacterial products through the lymph channels described in the foregoing, which eventually leads to chronic peribronchial glandular enlargement. Of the sinus involvements, that of the antrum is the most important because it is developed early, is the largest of the sinuses and is difficult to aerate and drain.

Three types of lung disorders resulting from paranasal sinus disease are described, namely: acute bronchitis, bronchial asthma, and chronic bronchitis and bronchiectasis. Acute bronchitis is usually coincident with an acute upper

respiratory infection. Frequently, asthma may be due to secondary peribronchial infection, bacterial or pollen-protein sensitization or reflex causes. In bronchial asthma any of the sinuses may be responsible, but the hyperplastic type of ethmoiditis is perhaps of paramount importance. Chronic bronchitis and bronchiectasis are due to protracted flooding of the lymph channels with infectious material from the nasal sinuses. The authors draw sharp distinction between bronchiectasis resulting from chronic sinusitis and bronchiectasis due to other causes, such as lung abscesses, foreign bodies and fibroid phthisis.

Association of bronchiectasis with sinus disease is too common to be accidental. These conditions often start in childhood, and a careful history will reveal the fact that the child has always been subject to protracted colds with a marked tendency to cough. The child is often undernourished, and may or may not have symptoms of involvement of the nose or sinuses.

SUPPURATIVE SINUSITIS IN INFANCY. PAUL KAHN, Monatschr. f. Kinderh. **33**:12 (July) 1926.

Suppurative sinusitis in infants is not often observed, probably because it is frequently without symptoms. This disease may develop as a complication of the exanthems of infancy, but, fortunately, serious sequelae seldom occur in very small children. Only suppuration of the ethmoids and antrums is considered here, these sinuses being present at birth, while the frontal sinuses and sphenoids are developed to a point of clinical importance only after the age of 5. Four sinus complications in nurslings were seen in the author's clinic in four years. The youngest patient was one 18 months old, in a case reported by Göeppert, and Panne has described five cases of suppurative sinusitis, the youngest patient being 6 weeks old. Typical edema, protrusion of the bulb and high fever developed, and the infant was cured by a curved incision around the inner angle of the eye.

The diagnosis is sometimes easily made, and at other times is established only at necropsy, owing to the absence of external signs. The clinical picture with external signs is definite. After a suppurative rhinitis, an edema of the lid and adjoining region, a livid color of the skin of the lids, a loosening of the tarsus and a protrusion of the bulb, due to periorbital involvement, develop. The conjunctivae are not injected or swollen. There is always malaise, high fever and loss of appetite, this syndrome pointing to a severe involvement. Especially frequent in children are the large vesicles which are in marked contrast to the bluish discoloration of the eyelids.

It is difficult to say, in the early stages of this illness, whether it is a suppurative rhinitis or beginning sinusitis. Only later does the latter condition reveal itself by involvement about the eye. The disease may resolve by discharge of pus, usually from one side of the nose, or after an incision has been made about the inner canthus. On the other hand, there may be a fatal termination, due either to sepsis or to meningitis.

The principal point to be considered in differential diagnosis is an osteomyelitis of the superior maxilla which, like the sinusitis, may be manifested by edema and swelling of the cheek. Osteomyelitis may develop from infection of a dental sac at birth, and may look much like sinus infection. Often it depends on secondary antrum infection from the teeth, which occurs with comparative ease through the spongy floor of the antrum.

Therapy may be either conservative or radical. Operative treatment in nurslings the author considers bad, since the only patient so treated died. Conservative methods saved two of five patients, and those so treated who died

were septic from the previous infection. Conservative treatment consists of hot compresses, tampons of epinephrine hydrochloride and foreign protein therapy. Endonasal procedures are considered only when there is a marked diminution in the purulent discharge from the nose without any lessening of the symptoms. The choice of operation may be left to the specialist. Panne advises waiting only two or three days and then opening the ethmoid through the median angle of the eye, and the antrum from the nose. Each makes a broad passage from the ethmoid to the nose.

CONNOR, St. Paul.

Miscellaneous

CHRONIC NONSPECIFIC INFECTIONS OF THE LUNGS: THEIR BRONCHOSCOPIC AND ESOPHAGEAL PHASES. CHEVALIER JACKSON, J. A. M. A. **87**:729 (Sept. 4) 1926.

The author points out that chronic, nonspecific infections of the lungs are diseases which should be treated by a combination of pediatrician, roentgenologist and bronchoscopist, and considers the bronchoscopic and esophageal phases of the subject under four heads: etiology, diagnosis, prophylaxis and treatment. Under etiology several points are mentioned. Stagnation of purulent secretion in the early stages of pulmonary suppuration is productive of the chronic condition which is seen later. Bronchoscopic aspiration offers much in this type of case, particularly when performed early. Any obstruction to bronchial ventilation and drainage is conducive to chronic suppuration. Among observed causes of bronchial obstruction may be mentioned congenital bronchial stenosis, congenital webbing of the bronchus, cicatricial bronchial stenosis and bronchial foreign body. Foreign bodies of vegetable type quickly cause severe sepsis, while foreign bodies of metallic substance are tolerated more easily and for long periods of time. This type of foreign body condition usually clears up promptly after removal of the foreign body. Numerous cases of suppuration in childhood have been found to be due to a foreign body.

Among esophageal causes of chronic pulmonary suppuration may be mentioned esophageal foreign body and esophageal stenosis. In both these types pulmonary complication is due to aspiration of secretions which overflow from the esophagus, due to the obstruction lower down.

Another type of chronic lung suppuration is the post-tonsillectomy type. This is of importance owing to its frequency and unfortunate sequelae when neglected. It comprises those cases in which a foreign body has been aspirated during the general narcosis of tonsillectomy. Varieties of foreign bodies have been found, such as parts of mouth gags and tonsil grasping forceps, braces, teeth, snare-wire and gauze spones. Diagnosis and bronchoscopic removal of these foreign bodies soon after their aspiration prevent any serious complication.

Bronchoscopic examination is useful in the differential diagnosis of bronchitic abscess, bronchiectasis, neoplasm and bronchial stenosis. It offers the one method of absolute certainty. It is also of use in obtaining uncontaminated secretion from which autogenous vaccines can be made, and for the insufflation of bismuth subcarbonate, and iodized oil, 40 per cent, for diagnostic purposes. Among the contraindications to bronchoscopy are mentioned, first, the cases of lung suppuration not due to a foreign body, in which the pediatrician, the surgeon and the roentgenologist agree that external surgical procedure is indicated; second, patients dying from conditions other than obstruction to the airway, and third, cases of lung suppuration due to causes

other than a foreign body, and in which rupture of the pleura is imminent. Bronchoscopy is contraindicated here because it is powerless to prevent the impending rupture. On the other hand, if a foreign body is present, such rupture can always be prevented by removal of the foreign body. Bronchoscopy is also contraindicated in diffuse, suppurative pneumonitis with a rapid breaking down of lung tissue when the condition is not due to a foreign body.

Prophylactic measures take the form of bronchoscopic aspiration used early in lung suppuration, of early diagnosis and removal of foreign bodies, and of all possible care to prevent aspiration of foreign bodies during tonsillectomy.

Treatment follows much the same lines. Early diagnosis and removal of foreign bodies and bronchoscopic aspiration of pulmonary abscess and bronchiectasis are of importance.

CONNOR, St. Paul.

A NEW HEAD SWEAT BATH. CAESAR HIRSCH, Ztschr. f. Hals-, Nasen- u. Ohrenh. **14**:540 (June 12) 1926.

Dr. Franz Geis, an ophthalmologist of Dresden, placed an apparatus at Dr. Hirsch's disposal, which has many advantages over Bruening's apparatus. Hirsch used it daily in many cases and recommended it highly. The heat is not created by electric bulbs, as in Bruening's apparatus, but by nonglowing, electric heat resisting bodies with long wave heat rays. These waves are distributed through a filter and adsorbed by the air. The irritation of the skin by short waves is avoided. The source of heat may be 150 C., and yet on the skin over the forehead it reaches only 44 or 45 C., and on the skin over the antrum 43 C. The patient's eyes do not need to be bandaged. A breathing tube may be used, but most patients do not want to use it.

A NEW SPEECH CANNULA FOR TRACHEOTOMY. M. S. SETTELEN, Ztschr. f. Hals-, Nasen- u. Ohrenh. **14**:550 (June 12) 1926.

A rather expensive but excellent apparatus was constructed by the author's uncle, Dr. Otto Settelen, a dentist, which was used by a patient uninterruptedly since 1921. A rubber bulb, placed in the region of the volar side of the wrist, closes a valve on the tracheotomy cannula by pressure. The patient is enabled to carry on a conversation even while dancing or playing billiards. The closing of the opening of the cannula is much more agreeable to the patient who forgets that he is an invalid. The voice sounds more natural. The construction of the ingeniously devised apparatus requires technical skill and is rather complicated. It is recommended for patients who cannot use the simple valve cannulas, or when the patient, owing to his vocational and social position, seeks an aid to unimpeded speech.

ALCOHOL IRRIGATION WITH THE TYMPANIC CANNULA IN CHOLESTEATOMA. EUGEN HOPMANN, Ztschr. f. Hals-, Nasen- u. Ohrenh. **14**:646 (June 12) 1926.

Warming alcohol on the plate of an electric stove is not more complicated than heating water. Koerner's priority is acknowledged. The alcohol can be used again after having been filtered.

AMBERG, Detroit.

Is an Otogenous Sinus Thrombosis More Frequently Located on the Right Than on the Left Side? Ludwig Haymann, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:1 (July 31) 1926.

Some authors (Toynbee, R. Meyer, Schwartze and others) have claimed that otogenous abscesses of the brain are found more frequently on the right than on the left side, and Koerner has claimed that this statement applies also to otogenous meningitis and otogenous sinus phlebitis. These views are found in most textbooks on otology, but are opposed by some authors (Hammerschlag, Okada, Neumann and Heimann) who doubt this statement. Concerning abscesses of the brain, Hegner found that sinus thrombosis occurred more frequently on the left than on the right side, but states that this condition on the right side occurred principally after acute middle ear suppuration. Haymann studied the same question, and came to the conclusion that the view is untenable that sinus thrombosis occurs more frequently on the right than on the left side.

Amberg, Detroit.

Disturbances of Production of Rhythm in Deaf-Mute Children. Oskar Bénesi, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:7 (July 31) 1926.

1. Twenty-four deaf-mutes, aged from 8 to 15 years, were examined for their ability to reproduce optic, tactile and kinesthetic rhythms.

2. Only six children were able to make approximately correct optic and tactile reproductions. One child gave a false reproduction of tactile rhythm.

3. The optic test gave the poorest results; the tactile gave better results, and the kinesthetic the best.

4. Control experiments on normal and feebleminded children proved that they responded well to the tasks imposed.

5. Among deaf-mutes who reproduce rhythms, subjects with preserved labyrinth function were in the majority. They also formed the majority in the group of subjects able to reproduce the same rhythms.

6. Such an unequivocal influence of the absence or presence of the cochlear function cannot be shown.

7. The author believes, therefore, that the vestibular nerve plays an important rôle in the physiologic mechanism of voluntary rhythm. The experiments prove that it is probable that the labyrinthian influence on rhythm depends on the otoliths.

Amberg, Detroit.

Society Transactions

AMERICAN LARYNGOLOGICAL ASSOCIATION, SCIENTIFIC SESSION

Forty-Eighth Annual Congress, Held at Mount Royal Hotel, Montreal, June 3-5, 1926

JOHN E. MACKENTY, M.D., *First Vice President, in the Chair*

THE USE OF RADIUM IN POLYPOID ETHMOIDITIS, WITH REPORT OF CASES. Presented by DR. SAMUEL MCCULLAGH, New York.

This article was published in the September issue, page 215.

DISCUSSION

DR. HARRIS, New York: Referring to the possibility of a complication, so far as the radium being swallowed is concerned, I have had a single case in which, fortunately, that did not occur, but in which unfortunately there was what I regarded as a burn. The radium was introduced exactly as Dr. McCullagh has indicated and the needles were kept in position by cotton in order to protect the septum. While there was no reaction in the ethmoid region, the septum in some way was injured. This delayed the healing of the nose for a period of fully three or possibly four weeks beyond the usual time.

DR. J. H. BRYAN, Washington, D. C.: I have seen some of the unfavorable results of radium when used on the tonsils. I have never seen a case in which it had been used for the relief of this ethmoidal condition. One patient who came under my observation had been treated by a local confrère; there was a serious and progressive ulceration following the use of radium needles in the tonsil region. The application was followed by intense pain and progressive ulceration.

DR. D. CROSBY GREENE, Boston: My experience in the use of radium has been with two patients who had chronic ethmoiditis whom I treated with radium, but the condition did not respond in the manner described by Dr. McCullagh. The important point in the application of radium seems to me to be the avoidance of the destructive elements of the rays by screening The septum particularly is very susceptible to the action of radium, and in all cases in which growths or tumors of the ethmoid region are being treated, it is essential to screen off the septum. Principally, in the use of radium in the nose, either for this or for a malignant condition, the dose should be graduated in relation to the patient's resistance. In some patients a certain dose results in a burn, while in others it does not.

DR. DELAVAN, New York: Radium has been applied to various parts of the body for other conditions, and for a long while it has been studied, but if one would thoughtfully consider what Dr. McCullagh has said, it would appear that he has done pioneer work. I have every reason for hoping that the work may prove to be successful, but note should be taken of one remark made by Dr. Bryan, namely, that the handling of radium is rather dangerous,

and that these patients should not be treated by the beginner, but should be placed in the hands of the most skilful users of that medium that can be found.

Dr. Mullin, Cleveland: I have had no experience in the use of radium in the treatment of polypoid ethmoiditis, but I have had considerable experience in treating asthma from the nasal standpoint as a causative factor, and Dr. McCullagh's paper seems to have thrown light on several points. I have been extremely gratified with the immediate results that have followed operative procedure on the ethmoid in the relief of asthma, only to find after the lapse of several weeks or a month that gradually the asthmatic symptoms have returned and then the condition has been as severe as ever. Day after day I have examined the noses of these patients when the attacks were becoming more severe, and I have seen no growth; finally, however, I have seen the recurrence of a polyp. It seemed to be springing from some cell that I had been unable to see during the previous examinations. With the return of this hyperplastic tissue in that cell and its springing out into the nose, the paroxysms became severe; apparently something in the radium, as Dr. McCullagh has shown, penetrated beyond the area where operative measures might control the situation.

Dr. Swain, New Haven, Conn.: I used radium in four cases with the idea of clearing up the condition and in all I was successful. One case I think is of sufficient merit to relate. The polyp formation was so great that in addition to the polyps there was a large cystic tumor of the anterior end of the middle turbinate. Above that, the polypi went into the frontal sinuses and eroded the partition between the two frontal cavities. I operated and opened down into the nose and exenterated the large part of the left ethmoid, which was the side most prominently involved. The operation was so clean that I thought the patient was cured; but later the polyps began to recur. Radium was applied, and a cure resulted. The operation was performed more than two years ago, and the polyps have ceased to form.

Dr. Law, New York: I consider the use of radium to be a distinct specialty, and I should like to advise every one to receive special instruction in its action and its use before attempting to employ it, or else to delegate treatments to a real expert. There have been many so-called experts in radium therapy, but the real ones are few, and in order to prevent serious complications it is wiser to let someone handle the material who is familiar with its use.

The End-Results of the Treatment of Malignant Tumors of the Antrum. Presented by Dr. Gordon B. New, Mayo Clinic, Rochester, Minn.

This article was published in the September issue, page 201.

DISCUSSION

Dr. D. Crosby Greene: Since Dr. New has obtained such wonderful results, I cannot claim that my own method is better. After the operation which I perform I leave a large facial opening, which enables me to determine the recurrence; I could not determine this otherwise. I therefore prefer to leave the opening for two or three years at least before closing. In regard to the method of treatment, during the past year I have used diathermy exclusively instead of the cauterizing iron.

Dr. Chamberlain, Cleveland: I should like to call attention to two cases. In Dr. New's first case he used the soldering iron. It seems that diathermy offers a very much better operative technic than the soldering iron. In the second case, there was early evidence of malignancy, and a symptom which

to me is unusual was the fact that the patient had an area on the floor of the nose about midway between the anterior opening and the antrum which was circumscribed and which manifested a point of hypersensitiveness. That was a point in the diagnosis which to me at least is absolutely new. Subsequently, in order to gain access to the nose, a submucous resection was performed, which was absolutely without pain until this very circumscribed area on the floor of the nose was touched. It was so extremely sensitive that cocaine, which was efficient in controlling the anesthesia in the rest of the nose, had no effect on this area.

Dr. Carmody, Denver: I have used the soldering iron, but now use the cutting instrument, as Dr. Greene suggested, following with radium. As to the method of opening, for several reasons I prefer the method of Dr. New, opening through the mouth.

Dr. Gordon B. New, Rochester, Minn.: The only question seems to be whether to use the soldering iron or diathermy. I think that the use of diathermy is certainly much better than the old method of the soldering iron. As to how the field should be approached, through the cheek or mouth, I think it makes very little difference.

Three Unusual Consecutive Cases of Frontal Sinus Disease. Presented by Dr. Lee M. Hurd, New York.

Case 1.—The patient had an acute purulent infection, probably associated with mucoceles from the beginning.

When first seen at the age of 16 years, he had a severe acute frontal sinusitis of the left side, with septic temperature and marked toxic symptoms. Intranasal operation did not relieve the condition. Radical operation disclosed that the frontal sinus was full of pus and its lining membrane necrotic; a large ethmoidal cell full of mucoid material blocked the drainage of the frontal sinus; the ethmoids were removed, and normal healing followed. Two years later, there was an acute infection of the cavity representing the left frontal sinus and of the right frontal sinus. A double radical operation was performed, and healing again followed. Four years later, the patient presented a painless and elastic swelling behind the nasofrontal articulation. Nine years after this the mass was larger, and the right eye was pushed outward and downward. At this time an acute infection occurred, and 2 drachms of pus was evacuated from the right frontal scar. Several weeks later, both frontal areas were explored, and a large mucocele of the right frontal and right and left ethmoid cells was found and exenterated; the Lothrop technic was used, and healing followed.

Case 2.—The patient had an ossifying periostitis.

A man, aged 43, had had a right pansinusitis for twelve years. Radical operations on the right frontal, ethmoidal, and maxillary sinuses performed nine months, and again a few weeks, prior to coming to me, had failed to relieve the condition. There was a fistula into the right frontal sinus through the eyebrow. On performing a radical operation on the right frontal sinus, it was found that both anterior and posterior walls were greatly thickened by masses of soft, newly formed bone, so that the frontal sinus was obliterated except for a cleft 2 mm. wide and a small pocket 5 by 10 mm. at the inner lower portion. This with all membrane was removed, along with the polypoid ethmoid cells. A radical antrum operation was also performed. Healing was prompt and undisturbed.

Case 3.—Acute panosteitis was present following trauma from impact with water, and probably rupture of the orbital ethmoid plate.

A girl, aged 18, in excellent health, fell from an aquaplane going at considerable speed, striking the water with great force. The same night she had pain about the left eye and a swelling of the lids. After five days, when I saw her first, the symptoms persisted, and there was an elevation of temperature to 102 F. Immediate operation by the external approach revealed a gangrenous membrane in the left frontal region, a softening and perforation of the interfrontal septum, and free pus in the right frontal region, and the anterior ethmoid cell walls beginning to necrose on the left side. A modified Lothrop operation was performed; there was a thickened periorbital membrane on the left side adjacent to the anterior ethmoids, but no orbital pus. Healing was only partial; through a small fistula at the internal end of the incision, bare and movable bone was detected. After twenty-five days, the old wound was opened. The bony bridge, the posterior frontal sinus wall and the anterior portion of the cribriform plate were necrotic, and the subjacent dura was covered with granulations; all were removed, and the wound was closed with drainage. Healing was uneventful.

DISCUSSION

Dr. Harmon Smith, New York: The first of these cases parallels a case which I reported some years ago. A man had a cystocele of the left frontal region of such enormous size that it projected through the anterior plate well forward. He was beginning to suffer from pressure symptoms and was operated on, not with the intention of finding a cystocele but with the thought that some kind of tumor was present. In operating, a cystocele which had broken down and penetrated the septum into the opposite side so that this sinus was also infected, was found. I performed a modified Lothrop operation in order to reach the cystocele. Its enormous size and the length of time the patient had endured its presence corresponded in a relative way to the first case reported by Dr. Hurd.

Dr. Swain: I have had two cases similar to those of Dr. Hurd. Both patients came with swelling of the upper lid and drooping of the eyeball, and the evidence of severe inflammation. Both were operated on. The second patient succumbed to severe osteomyelitis of the frontal bone.

Dr. Coffin, New York: One case suggests another, and all who have performed many operations know how frequently these cases recur. They may recur after periods varying from a few weeks to a dozen or more years. I know how thorough and skilled an operator Dr. Hurd is, but I cannot but feel that had he performed an absolutely radical Killian operation, leaving no diseased area in the first patient, there would have been no recurrence. His reference to the proliferating bone found in the second case recalls to my mind many patients I have seen in whom the proliferating bone partially or nearly filled the operated frontal sinus. I refer to one patient especially in whom new and dense bone filled the entire ethmoidal tract. Successful secondary operation was accomplished by treating the secondary diseased frontal area at operation as an open wound and packing for obliteration.

Dr. Simpson: In listening to Dr. Hurd's paper, I felt that better results could be obtained in these acute conditions, or in patients in whom there were swelling, edema, and so on, if the area was opened under cocaine anesthesia,

drainage tubes inserted until the acute symptoms were over, and then a secondary operation performed. My associate, Dr. Robbin Harris, and myself have performed over thirty of these operations by the local anesthetic method, and have found that we could clean out the frontal areas, the ethmoids and the sphenoids, removing the entire floor of the frontal region, and obtaining a very much better and cleaner field and performing a more thorough operation.

THE INFLUENCE OF NEGATIVE PRESSURE IN THE SPHENOID ON THE OPTIC NERVE. Presented by DR. LEON E. WHITE, Boston.

The fact that the opening of the posterior sinuses, although apparently normal, usually relieves optic neuritis, has led to the conclusion that these sinuses are in some mysterious way responsible for the eye condition. The foci actually responsible for most of the optic nerve disturbances have been found in the teeth and tonsils. The theory of negative pressure in the posterior sinuses would explain the beneficial results which follow the opening of normal sinuses.

Negative pressure was considered under two aspects: 1. Is it possible for negative pressure to take place in the posterior sinuses? 2. If it does exist, will this negative pressure favor the passage of the bacteria from the blood stream to the nerve?

Negative pressure is a well recognized condition in the frontal sinus, antrum, anterior ethmoids and middle ear, and is brought about by a closure of their ostia or ducts, so that, reasoning by analogy, a similar condition should be brought about by closure of the sphenoidal ostium.

In Bell's palsy, negative pressure within the tympanum seems to favor the migration of bacteria from some distant focus to the facial nerve, so that it seems logical to conclude that a similar condition of negative pressure within the sphenoid would favor migration of bacteria to the optic nerve. If it is conceded that a closed sphenoid favors the invasion of the optic nerve by bacteria from the blood stream, the logical conclusion is that the focus that feeds the bacteria to the blood should be eliminated.

Treatment was considered under three heads: 1. About 50 per cent of the patients will recover spontaneously. Any definite focus should be removed. If none is found, surgical intervention is contraindicated. 2. In 30 per cent of the cases, the relief of nasal blocking is indicated, in addition to the removal of the focus. 3. In somewhat less than 20 per cent of the patients, it is necessary to open the posterior sinuses to prevent optic atrophy.

Thirty-three optic nerve cases were analyzed. In only 15 per cent were the sphenoids and posterior ethmoids opened, and even in some of these it was unnecessary. Postoperative cicatricial obliteration of the sphenoidal osteum with resulting negative pressure occurred in one case.

DISCUSSION

DR. MCGINNIS, Chicago: I have had six or eight of these cases during the last year or year and a half, and there have been one or two additional cases in the hospital in another service. It seems to me that in optic neuritis there is some sort of infection in the optic nerve by bacteria which do not produce destruction of the nerve tissue, but a round cell infiltration and swelling. The destruction, I imagine, is due to pressure in the optic canal on the swollen nerve.

DR. FENTON, Portland, Ore.: An interesting factor in these cases, as pointed out by Van der Hoeve in 1921, is this very process of infiltration to which Dr. McGinnis referred. Van der Hoeve exhibited microscopic slides of direct penetration of the optic nerve sheath by bacteria.

DR. BABBITT, Philadelphia: I think that many physicians have been much concerned about this question of the high septum ethmoid pressure, and many are disappointed in the results of the septum operation, because the real point of the disturbance very high and very far back has not been relieved. This seems to me a special contribution, in its possible comparison with facial nerve disturbance under similar negative pressure and its later automatic recovery. This paper seems helpful in the decision as to relative focal importance between ethmoid sinus and tonsils.

DR. WHITE: In those acute conditions to which Dr. McGinnis referred, unless there is marked chronic infection, more than an acute condition, I generally treat the patients with sprays rather than perform an ethmoid exenteration. The patients almost always recover. The only condition that would lead me to operate would be an extremely small optic canal, for the strain of bacteria in such cases might be so virulent that it would not be wise to wait. I do not clean out the ethmoids unless there is more complication than an acute condition. The method of investigating these cases to determine where the focus is might be mentioned. A roentgenogram was taken of the patient; the teeth were referred to an expert odontologist, and the tonsils were studied. It seems to me that the teeth, tonsils and the antrum are the most ordinary foci of infection.

LARYNGEAL STENOSIS: ITS RELATIONS TO TRACHEOTOMY. Presented by DR. GABRIEL TUCKER, Philadelphia.

Laryngeal stenosis bears an important relation to tracheotomy, both as to its causation and its cure. High tracheotomy and improperly performed tracheotomy are the most frequent causes of laryngeal stenosis. The tracheotomic causes of laryngeal stenosis are classified by Jackson under eight heads, as follows: (1) hasty operation, (2) attempts at general anesthesia that result in respiratory arrest and stabbing operation, (3) high tracheotomy even when classically done, (4) division of the cricoid cartilage, (5) sewing up of the tracheotomy wound, (6) improper postoperative care, (7) wearing of a cannula of improper size, shape or material, or one with a fenestra and (8) neglect of ordinary decent cleanliness in the wearing of a cannula.

In cases of laryngeal stenosis, a cross-section at the level of the true cords was only half the area of the cross-section of the trachea below the level of the first ring of the trachea, while the peculiarities of the structure of the submucosal tissues in the conus elasticus were sufficient anatomic grounds for an explanation of the tracheotomic causes of laryngeal stenosis.

A properly performed tracheotomy should be done below the hypersensitive area of the conus elasticus into the trachea at its widest lumen where air can pass freely around the cannula, which is of a sufficient size to equal the glottic lumen. The tracheotomic cannula in this location assures rest for the larynx, which is the important consideration in its recovery from acute inflammatory conditions.

In chronic laryngeal stenosis, the tracheotomy tube in this position is well below the stenotic area, and peroral bougienage can be carried out without interference from the tracheotomy tube.

DISCUSSION

DR. SWAIN: One day a healthy woman, about 22 years old, came into my office, accompanied by her mother, who did the talking. She said, "Dr. Swain, I don't know whether you remember us. We came down for additional advice, and the question is whether Mary ought to have her tonsils taken out." Here was a patient operated on in the hospital in an emergency when she was 4 years old, and she was still wearing the tube. Forgetting all about the tonsils, I asked, "Why don't you take the tube out?" She replied, "I am afraid." I took out the tube, and the girl breathed all right. Her larynx had developed until it was of nearly normal size. She had nearly normal vocal cords; one was a little eroded, but otherwise the larynx was of good caliber but could not function because the vocal cords did not move properly. She had had multiple papilloma, but having worn the tube for eighteen years, she was now free from any evidence of the growths other than a general congestion and some thickening in the anterior commissure where the papilloma was originally located.

DR. MCKINNEY, Memphis, Tenn.: I am becoming convinced that preliminary tracheotomy is the best procedure to follow. I recall two cases in which death would not have occurred if tracheotomy had been performed sufficiently early.

DR. GOLDSMITH, Toronto: I wish to direct attention to the value of tracheotomy in cases of advanced tuberculosis in which there is profound edema, ulceration and even necrosis of the cartilage. Any one who has had much to do with cases of advanced laryngeal tuberculosis will realize that the patient knows the hopelessness of the case and experiences fear when he finds himself gradually becoming worse. I do not postulate that tracheotomy in these cases will cure the tuberculosis, but from a large clinical experience with tuberculosis of the larynx, and little experience with tracheotomy, I am satisfied that the patient receives great benefit from the knowledge that he cannot choke to death. The relief from this worry is extraordinary. Furthermore, occasionally one finds that setting the larynx at rest causes great improvement.

Another type of case in which tracheotomy can be used is bilateral paralysis. Sometimes tracheotomy is improperly performed, and stenosis follows. Often it is due to the haste with which the operator has to perform the operation or the desire to perform one that is spectacular

Another type coming under this head is chronic hypertrophic laryngeal inflammation, in which marked edema follows subglottic infiltration. For the time being the patient has laryngeal stenosis. It may be necessary to perform a trachetotomy, and then the hypertrophic laryngeal disease may be treated.

DR. IMPERATORI, New York: Proper ventilation around the tube, the proper size and type of tube to be used in tracheotomy and its proper placing are of great importance.

Regarding Dr. Swain's patient who had worn a tracheotomy tube for such a long time, I recall a case I reported some years ago, in which decannulation was performed eighteen years after the tracheotomy. I know that Dr. Arrowsmith had a patient who wore a tracheotomy tube for fifty or sixty years, this man having received an injury to his larynx at the battle of Gettysburg.

DR. TUCKER: Dr. Swain's case illustrates a properly placed tracheotomy tube. Dr. McKinney has spoken of emergency tracheotomy. Any operation that saves a patient's life is justified. If a high tracheotomy is performed in

an emergency, there is no reason why the patient should not be permitted to recover from the acute condition, and a week or ten days later the tube should be placed in a lower position in the neck; while it remains there it will have no tendency to cause stenosis. The whole procedure could be carried out with local anesthesia.

I have performed tracheotomy in tuberculosis in a number of cases and have obtained marked relief in the patients. In one thing particularly was improvement noted; namely, the patient was able to swallow food much more easily because the aspiratory difficulties were overcome by the air passing through the tracheotomy tube and not through the larynx.

CULTURES FROM THE TONSIL. Presented by DR. CHARLES W. RICHARDSON, Washington, D. C.

This article was published in the August issue, page 120.

DISCUSSION

DR. SWAIN: When Dr. Richardson concludes his remarks, will he tell about the time of year that he made these cultures and whether the work was spread over long intervals?

DR. KING, New York: I have always been interested in cultures taken from the tonsils, and during the last fifteen years I have taken many cultures from the tonsils of private patients, and have reached the following conclusions: Almost invariably, a mixed growth is found on the plate after twenty-four or forty-eight hours; the growth usually is composed of streptococcus, staphylococcus and pneumococcus; these are found almost constantly. Many varieties of streptococcus are found, and also many varieties of the staphylococcus. A large number of unidentified organisms are negative bacilli, positive bacilli, positive cocci. There is a great similarity between these cultures.

When there is massive infection on the plate there is a more serious condition of the throat than when there is a slight growth. I found free pus in the tonsils following the great epidemic of influenza or grip in the fall of 1918 and spring of 1919. I have seen three or four cases of fatal septicemia following *Staphylococcus albus* infection in the tonsils. The cultures have always been pure cultures of *Staphylococcus albus*.

DR. LOGAN, Kansas City, Mo.: A number of years ago, I investigated cultures of the tonsils and found practically the same organisms in the tonsil cultures and in cultures taken from the nasopharynx. To me, the vault of the pharynx has always been the key to the situation of organism invasion, owing to the presence of fibrous growths that exist in the vault and in the fossa of Rosenmüller.

DR. MULLIN, Cleveland: Clinically, we all have seen people with tonsils full of débris which necessarily must contain all the organisms that Dr. Richardson found, and yet there was no direct relationship between the amount of infection and the general symptoms that these patients had.

DR. GOLDSMITH: I should like to call attention to the expression "free pus in the tonsil," as I think there is a great deal of looseness in the use of that expression. The tonsil has many tubes, and these tubes are lined with epithelium. This epithelium is cast off there the same as in other parts of the body. It is nature's method of eliminating and removing the lining. It may come out in a cheesy mass, and in other cases liquefaction follows and the masses come out in a somewhat fluid state.

DR. RICHARDSON: The site of the well removed tonsil presents bacterial flora which is equivalent to the bacterial flora in the other two groups. I do not say nor do I intimate that one should be governed by the intensity of the activity of the bacteria. Under pressure, the toxins from them might assume a different degree of virulence. What I particularly want to impress on every one is the fact that the mere presence of bacteria in the smears is nothing, that is, nothing as regards diagnostic value.

Replying to Dr. Logan, I have not made any cultures from the pharynx.

ATRESIA OF THE NASOPHARYNX. Presented by DR. JOHN MACKENTY, New York.

Flaps are taken off the pharyngeal wall sufficiently low down to cover the atresia when liberated from the nasopharyngeal wall, and are turned upward after separation.

A detailed description of several cases was given, and lantern slides illustrated these cases.

DISCUSSION

DR. FENTON: I am interested in knowing whether Dr. MacKenty made use of any prosthetic apparatus such as a tube attached to the teeth or the upper jaw to hold open the artificial opening in the scar.

DR. SPENCER, Boulder, Colo.: An operation has been devised which is almost a combination of the two procedures which Dr. MacKenty has just shown. It might be of value in selected cases.

DR. CARMODY, Denver: The operation to which Dr. Spencer has called attention is one which I have performed.

DR. NEW: I have had great difficulty with this type of operation on account of the contraction that follows the open wound in the posterior wall in the pharynx. I have obtained the best results using fishline inserted through the small opening in the center of the scar, and also laterally on either side, holding the fishline with lead shot, and then gradually contracting this by drawing in on the fishline. This method has given the best result when other procedures have failed. I think it is the seton method.

DR. LYNCH, New Orleans: In four of my cases, operation performed by the first method described by Dr. MacKenty has been successful. In an effort to correct the contraction of the scar tissue on the posterior pharyngeal wall, I had an orthodontist build a dental piece like the tooth plate for the upper jaw, to which I attached a flexible rubber tongue which went up posteriorly, which was put in after healing had taken place. This flexible rubber tongue massaged that tissue and made it soft, so that after wearing it for about six months the patient was able to take it out. This operation was performed eight or ten years ago.

DR. MCCARTHY, Cincinnati: The bands that form in the throat following these plastic operations are not scar tissue but tendon. These result from the pull of the constrictor muscle of the pharynx. The whole difficulty is from the fusing of the lateral throat muscles into the posterior muscle sheet, the constrictor muscle of the pharynx. The natural pull of the constrictor muscle of the pharynx tends to close everything up. I have slit the posterior wall of the pharynx as far down as I could reach, dissecting up wedge-shaped portions of this muscle and transplanting it. This is successful in overcoming the pull of the constrictor muscle of the pharynx, and so increases the possibility of a successful outcome.

Dr. Imperatori: I have had the opportunity of operating on two patients in the past five years after the method which I thought was that of Dr. MacKenty. The method that I used was the seton method, and after two or three weeks of epithelialization around the seton, I dissected the flaps backward. Both cases were in children, and were due to traumatism. The results were very good, and the patients were cured. Both patients had previously been operated on by the dissection method, and a dilator kept in place, but with poor results.

In another case, a syphilitic contraction of the pharynx and nasopharynx, the stricture and the size of the opening were outlined by the use of iodized oil 40 per cent. This apparently would be a good procedure before operating, in order to ascertain the extent and outline of the stricture.

A Series of Esophageal Case Reports. Presented by Dr. Richmond McKinney, Memphis, Tenn.

Dr. McKinney reported four cases, varying in nature, to emphasize the value of esophagoscopy in arriving at a diagnosis. One patient was a woman suffering with thyroiditis, which probably was due to an esophageal laceration caused by a plum seed that she had swallowed some time before. The ulcer was revealed through the esophagoscope. In a second case diagnosis between a possible malignancy and a cardiospasm hinged largely on esophageal observations. The third was a syphilitic stenosis of the esophagus, shown through the esophagoscope, with ulceration into the mediastinum; the patient died. A fourth case was that of a malignant ulcer of the esophagus which perforated the trachea. The extreme importance of an early gastrostomy in cases of esophageal obstruction was stressed. This is a simple procedure and may prolong the patient's life; at least it will add to his comfort during his last days.

Several stereopticon slides illustrating the cases were shown.

DISCUSSION

Dr. Imperatori: I should like to call attention to the dictum of Dr. Jackson that early gastrostomy should be done, and also that ulceration of the cardiac end of the esophagus frequently produces cardiospasm.

Dr. Iglauer, Cincinnati: I am inclined to agree with the previous speaker that early gastrostomy should be performed in a dehydrated patient. This is illustrated by a patient I had who swallowed acid. Gastrostomy was performed, but everything poured into the stomach immediately ran out, and a gastro-enterostomy was performed with a great deal of difficulty. The patient progressed satisfactorily, but without these two surgical procedures — one to relieve the esophageal and the other the pyloric constrictions — he would not have survived. I feel that practically all perforated esophagi should be operated on by a thoracic surgeon.

Dr. Tucker showed a mirror for measuring the glottis.

A Simple Method for Introducing Fluid Into the Posterior Sinuses Without Causing Trauma. Presented by Dr. Arthur W. Proetz, St. Louis.

Dr. Proetz said that his presentation was a simple method of introducing fluid into the posterior sinuses without causing trauma. With the patient in the supine position, the head is allowed to hang over the edge of the table, so that the tip of the chin is above the external auditory meatus. The fluid is then allowed to run into the nose. It is floated in from a syringe, and

comes to rest in the pocket formed by the cribriform plate and the face of the sphenoid. It will not enter the ethmoid or the sphenoid because the openings are too small and displacement will not take place. Holding one nostril shut, about 12 mm. of mercury of negative pressure is applied to the other nostril, producing a slight vacuum in the sinuses. When the nostril is released, the drops run down into the sinus replacing the exhausted air. If one does that ten or fifteen times, the sinus will be filled with the fluid.

The solutions used were lipiodol for diagnosis, and physiologic sodium chloride solution for treatment.

FADS AND FANCIES IN THE PRACTICE OF OTOLARYNGOLOGY. Presented by DR. GEORGE E. SHAMBAUGH, Chicago.

Otolaryngology lends itself with peculiar readiness to the development of medical fads. One of the most spectacular examples in the whole history of medicine is that relating to the nasal reflex neurosis, the discussion of which began in 1871. Rhinology was still suffering from those advocates of nasal reflex neuroses who left it to the rhinologist to find something in the nose to operate on to cure such conditions as headache, neuralgia and dysmenorrhea.

A more active fad in recent years has been that of the indiscriminate removal of the faucial tonsils, undertaken often without any suspicion of local or general trouble or any palpable evidence of local tonsil disease, except the small, inconspicuous cheesy concretions universally found in tonsils of adults and which often seem to have been mistaken for pus.

A much abused fad of long standing in the practice of otolaryngology has grown out of a recognition of a certain relationship between some forms of ear disease and pathologic changes in the nasopharynx. This fad has led to a flood of indiscriminate surgical procedures for the correction of all sorts of real and imaginary atypical conditions in the nasal passages, irregularities of the nasal septum, variations in the size of the turbinal bodies and operations on the ethmoid.

All of these fads have a modicum of truth back of them. One of the most substantial contributions in recent years in otolaryngology was the recognition of the relationship between the optic nerve and the sphenoid and posterior ethmoid, and the fact that disease of these sinuses may affect the nerve. A great deal too much has been assumed in regard to the benefit derived from operations on these sinuses for the cure of optic neuritis, when no evidence can be discovered of any local disease.

The situation in the field of otolaryngology has not been improved in recent years by the fact that general practitioners have, in increasing numbers, begun to do operative work on the nose and throat. Such physicians can hardly expect to avoid performing unnecessary operations, since they do not have a proper technical training for making the necessary examinations and can have no background in clinical experience for evaluating their observations.

DISCUSSION

DR. RICHARDSON: A paper like this should be read and published as propaganda every few years. Faddism is dominant in medicine. At one time no physician was considered efficient in our specialty unless he possessed a galvanocautery and "reamed out," as it was called, the nasal chamber. Another fad rampant at one time in the Middle West was the extirpation of every middle turbinate that presented itself. These faddists are a menace to the advance-

ment of scientific medicine. They are pests in the medical body. They live a short time and then die out.

DR. WHITE: Too much work has been done on the accessory sinuses. I am interested in Dr. Richardson's reference to the tonsils, and feel that a great many tonsils have been needlessly taken out.

DR. LOGAN: Dr. Richardson's remarks give evidence of the trend of the present time in trying to correct the pendulum that has swung too far. In self defence, a man is often more or less forced by the general practitioner to do those things which he does not believe should be done. In many instances, tonsils were operated on when an operation should not have been performed. The same is true of the ethmoids, as Dr. Shambaugh has said.

DR. BRYAN: I am much in accord with some things that have been said, but I do not want the impression to go out that the members of this Association are under the domination of the general practitioner, and that they have to operate according to his ideas.

DR. EMERSON, Boston: Most of the older men have been trained in general medicine, and recognize the relation between a local manifestation and a general disease. A careful history should be taken in every case.

PERIDACRYOCYSTITIS AND PERIOSTEOMYELITIS OF THE SUPERIOR MAXILLA FOLLOWING MAXILLARY SINUS OPERATIONS: REPORT OF FOUR CASES. Presented by DR. HAROLD I. LILLIE, Mayo Clinic, Rochester, Minn.

Four patients have been observed in whom periosteomyelitis of the superior maxilla took place after intranasal operations on the maxillary sinus had been performed. The initial symptom was severe pain with nothing to account for it. Swelling and redness starting in the region of the lacrimal duct followed. Definite dacryocystitis could not be demonstrated, so it was felt that the condition was a peridacryocystitis from extension of infection along the course of the nasolacrimal duct. This duct may have been injured at the time of operation. One patient in a very poor general condition died from meningitis. The only patient on whom medical diathermy was used developed sequestration of the bone, and it was necessary to remove the sequestrum. No conclusion was drawn from this observation. In one case the lacrimal duct was removed late in the course of the disease. The management of the disease was the same as that of periosteomyelitis in general. Surgical drainage of the suppurative process was relied on to control the disease.

DISCUSSION

DR. CARMODY: I have seen three cases of this kind in the last few years, and two cases of osteomyelitis of the frontals in which the maxillary sinus as well as the frontal was involved. Before leaving home, I saw a case exactly similar to that of Dr. Lillie. The pain was so severe, and had been for two or three weeks, that morphine did not control it. Most of the pain was over the nasal process of the superior maxilla. The maxillary sinus was dark, both frontal sinuses were dark on roentgen-ray examination, and the ethmoids were very much involved. I recommended the opening of the sinuses in this case, not radical operation, but opening for drainage. The ethmoid was opened, and when I saw the patient two weeks later the condition was about the same. The frontal sinuses were draining a great deal of pus. The patient was subsequently operated on by a general surgeon, and died later. This apparently was an acute condition.

I saw another patient who had had nasal polypi for years, on whom I operated externally as well as internally. These openings were made simply for drainage because of the intense pain, and pus was evacuated under pressure. The osteomyelitis continued. This was treated with medical diathermy, but the patient died of meningitis.

DR. DEAN: The lacrimal or nasolacrimal duct normally opens high up in the inferior meatus directly under the inferior turbinate or low down. The lower the opening, the more marked is the valve-like structure closing the opening, and the more marked is the nipple in which the duct ends. As a matter of fact, when it opens just beneath the inferior turbinate, the nasal orifice is funnel shaped and very wide. I suspect that, as a rule, in my operations on the maxillary sinus, I injured the duct. The lower the opening, the more certain is the duct to be injured. Cutting the duct low down probably makes the opening into the nose wider and more similar to the opening when it is located high up. Perhaps this cutting also makes the duct a better drainage tube than when it opened normally through the valve-like orifice.

SYNERGISTIC ANALGESIA AND ANESTHESIA. Presented by DR. JAMES J. KING, New York.

Synergism may be defined as the reciprocal augmentation of the action of one drug by that of another. No satisfactory explanation has been given. The combined action of morphine, magnesium sulphate and procaine hydrochloride is far greater than the action of morphine alone.

Summary of Technic.—For the average patient, from 130 to 150 pounds (from 59 to 68 Kg.) in weight, three intramuscular injections are usually required. No food should be given for at least six hours before operation. Three hours before operation the first injection is given intramuscularly. The injection consists of 2 cc. of a solution of magnesium sulphate, 50 per cent; procaine hydrochloride, 2.5 per cent, and morphine, ⅛ grain (2 mg.). The injection must be sterile, and the patient should be kept quiet in a darkened room. The injection should be repeated at half-hour intervals until two or three injections have been given. One and a half hours after the last injection, the patient is transferred to the table in the operating room, with the least possible disturbance to him. If necessary to use local anesthesia, 0.5 per cent of procaine hydrochloride may be employed.

EMBRYOLOGIC STUDY OF THE FORMATION OF THE ACCESSORY NASAL SINUSES. Presented by DR. NORVAL H. PIERCE, Chicago.

Perhaps it is known that the work that has been done on the normal and pathologic mastoid was correct. It has led to valuable knowledge and, fundamentally, Dr. Pierce believed that we should proceed along these lines in the future in a newer pathology of mastoiditis. The question comes up as to whether these same pathways of investigation may be applied in nasal pathology as regards the accessory sinuses. He did not add anything new regarding the fact that the accessory sinus develops from the nasal chamber, but he applied certain general propositions to the manner in which they develop. That, he believed, was original.

With regard to "lumensation" of the mastoid, there are three elements to deal with: the mesenchyme, the mesenthelium and the bone. In the case of the accessory sinuses, there is the epithelium derived from the entoderm and the mesenchyme. The bone plays little or no part in the picture. Whitbeck

stresses the fact that the mesenchyme is the chief factor in the enlargement of the narrow spaces in the production of the air space. He adopts Asch's idea as to the factor which interferes with the "lumensatizing" process, a process that is looked on as a foreign body reaction.

That was an insufficient cause for the vital changes that take place in the mesenchyme. Power to prevent the mesenchyme from eroding the surfaces of the bone in order to enlarge a cavity seemed to him to be an insufficient explanation, and he believed this power of eroding bone originally rested with the blood vessels. He believed that we had to go a step farther back in the formation of these cavities to the blood vessel, to the vascularity of the bone or the cartilage, before the cause of this arrest of pneumatization can be found. He believed that factor perhaps plays an important part in the pneumatization also, if it may so be designated, of the nasal chamber. He showed that there seemed to be a law which governed the formation of pneumatic spaces in bone, and another law which governed the formation of the pneumatic spaces in the nose. In one case, it was the pneumatization in bone, and in the other the pneumatization as it occurred in the nose by means of the invasion of the mesenchyme surrounding the nasal chambers by the processes of the epithelium and of the cylinder epithelium; when that had invaded the mesenchyme from the interior of the nasal chambers it split; this law governed not only this process but it governed the formation of the eustachian tube, which was not at first encased in bone, and also the formation of the tympanic membrane. That was an entirely different process from the pneumatization of bone as it was found in the mastoid.

Immediately connected with the invasion of the mesenchyme by the epithelium, a vascular preparation was always seen, or at least it was found that the invasion of the mesenchyme by this epithelium was accompanied by a blood vessel either in close proximity or in absolute contact. He believed that it would be found that this blood vessel, this vascularity, has a bearing on this process that was at present undreamed of. Whether these objects that appear to be blood vessels are actually blood vessels, or whether they are different kinds of tubes in the mesenchyme which carry the germ of the epithelium, he was unprepared to say. It was unorthodox, of course, to think that a blood vessel can supply the endothelium in a cavity that will contain air, but he would not be surprised if that was a possibility. It is a matter of great controversy among histologists, but Dr. Pierce said that he would not be surprised to find that the blood vessel was intimately connected with the epidermization of these cavities. Whether by supplying the mesenthelium the endothelium turned into mesenthelium, or whether it was that these blood vessels shove before them a finger of epithelium, he was unprepared to say.

The address was illustrated by a number of lantern slides.

PATHOLOGIC CHANGES IN THE ACCESSORY NASAL SINUSES. Presented by DR. THOMAS E. CARMODY, Denver.

Dr. Carmody discussed the structure of the normal mucosa lining the accessory nasal cavities. He also discussed changes in acute suppurative conditions, the more marked changes found in subacute and chronic conditions and the effect of these changes on the bone and on the nasal mucosa.

DISCUSSION

DR. SPENCER: It goes almost without saying that the clinical diagnosis is of the most importance, and the roentgen-ray and the pathologic diagnoses

are only aids to making the clinical diagnosis. The difference in size of the sinuses when examined by roentgen ray makes a little difference. The angle and penetration are all factors. The pathologist will have difficulty in making a diagnosis from small specimens, but when they are trained in the examination of tissues from the ear, nose and throat, they are apt to be more expert in helping us to make our diagnosis.

DR. SKILLERN: I wish to correct an erroneous impression inadvertently made by Dr. Carmody when he states that there is an increase in glandular substance due to inflammation. There is, of course, hypertrophy of these glands and apparent increase in the gland substance. It is only apparent, not real, and is owing to the round cell infiltration which occurs and collects around these glands.

DR. SEWALL: I have had all specimens examined pathologically, particularly those from the ethmoid and sphenoid, and frequently the superficial layers of the epithelium are entirely denuded from those specimens taken from the sinuses.

DR. NORVAL PIERCE: The first suggestion I wish to make is that when the specimen is decalcified it should be cut; the difference in results is surprising when examined under the microscope; in cutting through a hard bone it makes no difference how much care one takes, because the specimen will be injured. The inner lining of the cells becomes torn.

The next point is that these specimens resemble the embryologic condition rather closely. In other words, when bony tissue and tissue connected with the bone is irritated in any way, it tends to recede to the embryologic condition. That is a law.

The next point I wish to make is that whenever an area is present that should be covered with ciliated epithelium and cuboidal epithelium, inflammatory changes are induced there by irritation of some kind. Whenever ciliated epithelium is replaced by cuboid epithelium, it has a deep significance; at least we know there has been either a malformation originally, going away back to the primary germ, or it is an epithelial inflammatory tissue.

DR. KISTNER: The connection of the actual pathologic observations in the tissue with the clinical evidence gained before operation is of great importance. The question of the technic of the tissue preparation comes up. I have been doing this work for quite a while, connecting the pathologic observations with the history, in order to obtain some intelligent idea as to what is meant. Traumatized tissues show a denudation. In other words, the upper layers of the epithelium will be gone, simply by brushing. I never send in a specimen that I feel has been traumatized. Take the antrum, for instance, the mucoperiosteum is pushed off after the opening is made, a piece is cut loose with the scissors and placed on a piece of heavy paper, immediately spread flat and dropped into the fixing solution.

DR. LYNCH showed a slide of a case of maxillary sinus, in which the patient had been operated on and showed development of the sinuses after his convalescence. It might have a bearing on both the pathology and on Dr. Pierce's work.

EXTERNAL OPERATION ON THE ETHMOSPHENOID-FRONTAL GROUP OF SINUSES, UNDER LOCAL ANESTHESIA: REPORT OF CASES. Presented by DR. EDWARD C. SEWALL, San Francisco.

This article was published in the November issue, page 377.

DISCUSSION

DR. MACKENTY: Dr. Sewall, does the deep injection of procaine hydrochloride permit any of it to get into the optic nerve?

DR. PIERCE: It has been suggested that the cause of the danger has been getting the needle into the vessel and injecting the procaine hydrochloride directly into the circulation, and I suggest that in making the injections, before injecting the solution one should remove the barrel of the syringe from the needle to see if blood comes out; if it does, the needle is in the vessel; otherwise, it is safe to proceed.

DR. HARMON SMITH: "When all methods had been exhausted whereby one could enter the sinuses, then treatment would become popular." Dr. Jonathan Wright made that statement. I do not know why treatment is so unpopular for the care of sinusitis. It is rare that I operate, and yet I see quite a number of patients with sinus trouble. If these patients are treated with Smith's sinus suction syringe, which seems to be so unpopular, a great number of them will recover without an operation.

I am impressed with Dr. Sewall's technic and method of approach, which I myself have never attempted, but which I can conceive is a wonderful method. At the same time, I think that a large proportion of these patients can be cured without operating.

CARCINOMA OF THE LARYNX AND LARYNGOPHARYNX TREATED WITH RADIUM. AN ANALYSIS OF THIRTY CASES. Presented by DR. CHARLES J. IMPERATORI.

This article was published in full in the August issue, page 151.

DISCUSSION

DR. HARMON SMITH: I believe the reports of cure of cancer by radium are those that bear striking similarity to case 15 reported by Dr. Imperatori. I have sent a number of patients with cancer to the late Dr. H. H. Janeway and to Dr. Quick, but in my recollection none was ever cured. They may have had a retrogressive condition produced by the radium, but so far as cure is concerned, I know of no case of real epithelioma that was cured. Two of my patients were under consideration of both of these physicians. One, a woman, lived for eleven years; another for fifteen years, and so far as I know is still living. These patients refused operation in each instance. Dr. MacKenty saw both of these patients in consultation and advised operation, which was refused. Dr. MacKenty saw the first of these last summer when the patient was in my office for a radium treatment, and he was in a terrible condition. I do not believe that anyone can determine the status of cancer. I do not believe the microscope can tell one how malignant the growth is. The diagnosis of cancer can be made, but the determination of the malignancy is different, and on the malignancy depends our conclusions relative to treatment and cure. So far as I know, the knife is the only method that had cured cancer. A number of treatments have been alleged as cures for cancer, but the cases must have been of the borderline and not of the virulent type.

I take issue with Dr. MacKenty as regards biopsy. I think if a man of Dr. MacKenty's type could see every patient, it might help him to determine if the condition is cancer, but to have the opinion spread around that we should operate and remove the larynx because of the clinical appearance does not seem right in my opinion. It should not be the privilege of every man to operate and remove the larynx, or half of it, merely on the clinical evidence

gained from the eye. Therefore, I think biopsy should be performed as an aid to diagnosis.

DR. SEWALL: I should like to ask the chairman particularly in regard to the statement that when a biopsy is made, it should be followed by operation within twenty-four or thirty-six hours.

DR. MACKENTY: Dr. Imperatori has presented this material carefully worked out, and it confirms what I have believed for a long time, namely, that radium is useless and extremely pernicious in the treatment of squamous cell carcinoma. Basal cell carcinoma is variable. I have not seen authenticated cures of well established squamous cell carcinoma.

It seems to me that it is about time for the use of radium to be discontinued in the treatment of cancer of the larynx. If roentgen-ray treatment is not going to be effective, I think the only hope is through surgical intervention. Carter Wood is experimenting with high voltage roentgen-ray treatment, and we have had a short report of it in Dr. Imperatori's paper.

With reference to Dr. Sewall's question as to why one should operate immediately after a biopsy, if it is possible operation should be performed half an hour or an hour afterward. I do not think one should rely on frozen specimens. It is better to wait until one can make a perfect examination. Of course, I have been more or less against biopsy if it could be avoided, but I realize that unless a man has had an enormous amount of experience he is likely to make a mistake without the help of the biopsy. It seems to me safer to operate as soon after the biopsy as practicable.

DR. DAVID JONES, New York: I know of three cases that are interesting. One case was that of a patient who came from another hospital on whom a thyrotomy had been performed. He appeared to have had either syphilis or tuberculosis. A biopsy was performed and a carcinoma was found.

Another case was one of carcinoma of the epiglottis, while the third case was keratosis of the larynx. This case of keratosis was considered by Dr. Imperatori to be precancerous; eventually, that is, eight months afterward, a biopsy showed it to be cancerous. Logan Turner reports only four cases, and the Surgeon General's office does not report any case of keratosis.

CHARLES J. IMPERATORI, M.D., Abstract Editor.

Book Review

KONSTITUTIONSPATHOLOGIE IN DER OHRENHEILKUNDE. DR. JULIUS BAUER and DR. CONRAD STEIN. Price, 24 reichmarks. Pp. 340, with 58 illustrations. Vienna: Hirschwaldsche Buchhandlung für Medizin, Naturwissenschaften u. Mathematik, 1926.

Under the caption of constitutional pathology of the ear, the authors discuss such conditions as congenital anomalies involving the organ of hearing, including anomalies of the auricle as well as of the middle and internal ears. A discussion of the middle ear conditions includes the catarrhal and inflammatory diseases of the middle ear, congenital facial paralysis, congenital tumors of the middle ear. The larger part of the work is a discussion of those conditions which involve the internal ear and constitute the basis for the greatest number of severe cases of deafness, for it includes otosclerosis, chronic progressive deafness, labyrinthine deafness and deaf-mutism. The hereditary factors in ear diseases, such as otosclerosis in labyrinthine deafness and deaf-mutism, are discussed in a special chapter.

This volume presents an admirable summary of the known facts regarding these phases of otology. The accumulation of such data as here presented is a tedious process. On the whole the conditions are unsatisfactory to treat. Everyone preparing to practice otology should make an effort to acquire a knowledge of the pathology of the conditions presented in this book, for without such knowledge it is impossible for one to evaluate properly the various methods of treatment, mechanical, medical or physical, which are constantly being used on patients suffering from incurable deafness.

INDEX TO VOLUME 4

The star (*) preceding the page number indicates an original article in The Archives. No author entries are made except for original articles. Book Reviews and Society Transactions are indexed under these headings in their alphabetical order under the letters B and S, respectively.

PAGE

Abscess, mediastinal, Ludwig's angina and, following tonsillectomy 274
peritonsillar, new method of anesthesia for opening 452
retropharyngeal, discharging through the right ear 96
retropharyngeal, with erosion of normally placed internal carotid..... 361

Acoustic Nerve, tumor, erosion of petrous bone by; demonstration by roentgen ray *515

Adenoidectomy, postadenoidal speech.....*296

Adenoidism and abnormalities in conformation of nasal septum and upper jaw.. 89

Alcohol irrigation with tympanic cannula in cholesteatoma 549

Alden, A. M.: New procedure in treatment of chronic maxillary sinus suppuration in children *521

Allergy, advancement in our knowledge of, as related to otolaryngology during past 2 years *430

American Otological Society, presidential address 459

Anesthesia, nerve block, tonsillectomy by...*421
new method of, for opening peritonsillar abscess 452
synergistic analgesia and..... 563

Aneurysm of aorta..... 94
aortic, serial frozen sections of thorax in sternum-eroding aneurysm of arch of aorta 94

Angina agranulocytotica 256
Ludwig's, following tonsillectomy..... 274

Antrum of Highmore: See Maxillary Sinus

Aphonia.....*46, 96, *122

Asthma, advancement in our knowledge of allergy as related to otolaryngology during past 2 years.....*430
method of treating, by radiation..... 353

Audio-controller *160

Audiometer, comparison of results made with 2 types of..... *51
survey of school children by audiometric methods 272

Aviation, stable nervous control in relation to flying efficiency..... 354

PAGE

Bacteremia associated with acute hemolytic streptococcic throat infections..... *97

Ball, F. E.: Acute suppurative mediastinitis *512

Ballenger, H. C.: Bacteremia associated with acute hemolytic streptococcic throat infections *97

Bath, new head sweat bath..... 549

Biopsy in suspicious growths of larynx.... 266

Blindness, injury of optic nerve..... 355

Blood, picture, in otogenous disease, significance of? 90
pressure alterations, influence of, on experimental vestibular nystagmus..... 447

Book Reviews:
Cavernous Sinus Thrombophlebitis and Allied Septic and Traumatic Lesions of Basal Venous Sinuses. Clinical Study of Blood Stream Infection; W. P. Eagleton 376
Konstitutionspathologie in der Ohrenheilkunde; J. Bauer and C. Stein.....568
Local Anesthesia in Otolaryngology and Rhinology; with Supplement on Toxic Effects of Local Anesthetics, Containing Complete Reports of Various Committees of the American Medical Association Made to the Therapeutic Research Committee of Council on Pharmacy and Chemistry; J. J. King 478
Notions élémentaires d'oto-rhino-laryngologie à l'usage des practiciens; G. Liébault 374
Physiotherapy in Diseases of the Eye, Ear, Nose and Throat with Chapters on Some Borderline Affections; A. R. Hollender and M. H. Cottle..... 477
Politzer's Textbook on Diseases of the Ear; M. J. Bellin..... 478

Bougies, local treatment of eustachian tube; present status of bougie.....*196

Brain, abscess, connection of, with bronchiectasis 455
abscess, intradural complications of aural and nasal origin; survey of recent literature *163
abscess, is otogenous sinus thrombosis more frequently located on right than on left side?..... 550
abscess, osteitis mandibulae with..... 457
abscess, otogenous 260
abscess, temporal lobe abscess..... 357
intradural complications of aural and nasal origin, survey of recent literature; rôle of ear and nose in intra cranial lesions in general..... *69

PAGE

Brandon, W. R.: Contractured ulnar paralysis; relieved by treatment of nasal (sphenopalatine) ganglion.....*493

Breitstein, M. L.: Zygomatic mastoiditis without clinical otitis media.....*300

Bronchiectasis, brain abscess with..... 455

Bronchoscopy, chronic nonspecific infections of lungs 548
demonstration of lower air passages by intratracheal injections of lipiodol..... 264
extensive lung abscess involving entire right inferior lobe; case treated successfully with suction through bronchoscope *334

Bronchus, roentgen study, preliminary report on radiographic exploration of broncho-pulmonary system by means of lipiodol 354

Cancer, carcinosarcoma, its diagnosis and nomenclature, and apparently healed carcinoma of upper jaw..... 263
malignant tumors of antrum of Highmore; end-results of treatments.....*201

Cannula, new speech cannula for tracheotomy 549

Carotid Artery, experimental carotid injection of procaine hydrochloride..... 456
retropharyngeal abscess with erosion of normally placed internal carotid..... 361

Cartilage vessel systems and otosclerotic areas 254

Cavernous Sinuses, phlebitis of.....181, 258
thrombosis, complicating acute mastoiditis 265
thrombosis, otological studies of..... 465

Cerebellum, abscess, diagnosed and healed by puncture of cerebellum and incision of dura 183
abscess, intradural complications of aural and nasal origin; survey of recent literature *163

Cervical Ganglion, superior, sympathetic, syndrome 456

Choana, posterior: See under Nose

Cholesteatoma, alcohol douches with tympanic tube in..... 85
alcohol irrigation with tympanic cannula in 549

Chondroma of ethmoid with operation and cure 89

Clerf, L. H.: Nonendoscopic cases of foreign bodies in tonsil.....*489

Cocaine, intoxications, acute, phenobarbital in prophylaxis and treatment of.....*304

Cochlear Duct, reactions induced through ductus endolymphaticus and aqueductus cochleae *137, 273

Conner, H. M.: Hysterical dysphagia *112, 239

PAGE

Cranium, fossa, middle, surgery of..... 343
fractures, otologic complications of basal skull fracture *35
injury, followed by involvement of labyrinth and cochlea..... 363

Cultures from tonsils.....*120, 558

Davies, J. W.: Ephedrine in nasal disturbances *240

Deaf, audio-controller in education of....*160
how deafened are helping otologist..... 267

Deafness, differential diagnosis of, in school children 470
interpretation of speech by tactual and visual impression *228
laymen's efforts for deafened..... 469
nature of hardness of hearing during pregnancy 344
nerve, etiology and treatment of..... 472
pathohistologic changes of hearing organ in typhus 345
pathological changes in mesenchyme of middle ear of fetuses, or mesenchyme of human cavum..... 467
progressive, otosclerosis in etiology of *127, 469
treatment, local, of eustachian tube; with special reference to present status of bougie *196
treatment of lateral pharyngeal bands for, by roentgen-ray; 100 cases..... 460
tubal, caused by sarcoma, recovery from 349

Diphtheria following tonsillectomy..... 255
wound, in aural surgery..... 538

Diplococcus mucosus, bacteriologic variations in ear conditions due to..... 449

Dixon, O. J.: Typhoid fever simulating sigmoid sinus thrombosis.....*298

Duel, A. B.: Local treatment of eustachian tube; with special reference to present status of bougie.....*196

Duke, W. W.: Advancement in our knowledge of allergy as related to otolaryngology during past 2 years.....*430

Dysphagia, hysterical ...*112, (correction) 239

Eagleton, W. P.: Intradural complications of aural and nasal origin; survey of recent literature *69 *163

Ear, bacteriologic variations in ear conditions due to Diplococcus mucosus..... 449
comparative anatomy and physiology of auditory tube in its relation to that of middle ear 462
diphtheria of wound in aural surgery... 538
diseases, significance of blood picture in 90
furunculosis of auditory canal..... 270
internal: See Labyrinth
intradural complications of aural and nasal origin, survey of recent literature; rôle of ear and nose in intracranial lesions in general..... *69

Ear—Continued PAGE

middle, clinic and treatment of tuberculosis of 176
otological complications of basal skull fracture *35
pathohistologic changes of hearing organ in typhus 345
pathological changes in mesenchyme of middle ear of fetuses, or mesenchyme of human cavum..... 467
physiology 254

Electrolysis, zinc wires and needles for ionization and 455

Embryologic study of formation of accessory nasal sinuses..... 563

Empyema and term "mastoiditis," warning concerning 541
complicated, of frontal sinus..... 454

Endocrine Glands, is there an endocrine factor in otosclerosis?..... 544

Endolymphatic Duct, reactions induced through aqueductus cochleae and *137, 273

Endolymphatic Sac, and its relation to labyrinthine muscle tonus..... 365

Ephedrine in nasal disturbances.....*240

Epiglottis, removal of..... 346

Epinephrine probe test of Muck..... 351

Esophagoscopy (remark on article of Stewnberg) 90
easier method of introducing esophagoscope *307

Esophagus, diverticula of..... 353
series of case reports..... 560

Ethmoid Sinus, chondroma of, with operation and cure..... 89

Ethmoiditis, polypoid, radium in, report of cases *215, 551

Eustachian Tube, local treatment of, with special reference to present status of bougie *196
pathology and surgery of; with special reference to value of closing it.....*189
roentgen-ray treatment of..... 86

Eye, complications of nasal obstruction... 359

Fads and fancies in practice of otolaryngology 561

Fistula, retro-auricular, closure of..... 94

Fletcher, H.: Comparison of results made with 2 types of audiometer..... *51

Foreign Body accidents during tonsillectomy 188
aspiration of tooth prosthesis into larynx 86
in accessory nasal sinuses..... 361
multiple, in resipratory and digestive tract 263
needle in cervical region tolerated for 5 months *520
nonendoscopic cases of, in tonsil.....*489

Freedman, A. O.: Mixed salivary tumor in tonsillar region *14

PAGE

Frontal Sinus, roentgen diagnosis of..... 352
treatment of chronic suppuration of.... 259

Frontal Sinusitis, complicated empyema of frontal sinus..... 454
retrobulbar neuritis due to..... 88
three unusual consecutive cases of..... 553

Furunculosis of auditory canal..... 270

Galvanocautery in tuberculosis of larynx 453

Ganglion: See Cervical Ganglion; Sphenopalatine Ganglion

Gastroscopy (remark on article of W. Stewnberg) 90

Gault, R. H.: Interpretation of speech by tactual and visual impression....*228, 462

Glassburg, J. A.: Postadenoidal speech...*296

Goodyear, H. M.: Iodized oil in diagnosis of nasal sinus conditions.....*223

Gowen, F. V.: Tonsillectomy by nerve block anesthesia *421

Guttman, M. R.: Phenobarbital in prophylaxis and treatment of acute cocaine intoxications; preliminary report of its clinical trial *304

Halsted, T. H.: Pathology and surgery of eustachian tube; with special reference to value of closing it.....*189

Hastings, H.: Bilateral jugular resection for bilateral sigmoid sinus thrombosis (otitic) *58

Hay Fever, advancement in our knowledge of allergy as related to otolaryngology during past 2 years.....*430

Headache, papillitis, and mental depression from osteoma of septum..... 87
superior cervical sympathetic ganglion syndrome 456

Hearing: See also Deafness
interpretation of speech by tactual and visual impression *228
new principle for aiding..... 85
perception, relation of tactile sense impression and 269
reactions induced through ductus endolymphaticus and aqueductus cochleae *137, 273
tests, comparison of results made with 2 types of audiometer..... *51
tests, functional 272
tests, results of survey of school children by audiometric methods..... 272

Heatly, C. A.: Medicolegal importance of microscopic investigation of temporal bone *28

Hemostat, artery hemostat.....*338

Herpes zoster oticus and allied conditions with notes of 3 cases..... 449

Holderman, J. W.: Occurrence of otosclerosis in etiology of progressive deafness *127, 469

PAGE

Hubby, L. M.: Reactions induced through ductus endolymphaticus and aqueductus cochleae *137

Imperatori, C. J.: Carcinoma of larynx and laryngopharynx treated with radium *151, 566
Infections, focal; dental standpoint..... 277
focal; internist's point of view..... 275
focal; nose, throat and ear standpoint.. 276
focal; ophthalmological standpoint..... 277
Injections, intratracheal, of lipiodol, demonstration of lower air passages by.. 264
Instruments: See also Audio-controller; Audiometer; Hemostat; Speculum; Syringe; etc.
new procedure in treatment of chronic maxillary sinus suppuration in children *521
Ionization, in tympanic sepsis..... 447
result of ionic medication in chronic middle ear suppuration..... 446
treatment of chronic discharging ears and allied conditions by..... 448
Iridocyclitis and focal infection..... 277

Jaw, carcinosarcoma, its diagnosis and nomenclature, and apparently healed carcinoma of upper jaw..... 263
osteitis, with brain complications..... 457
peridacryocystitis and periosteomyelitis of superior maxilla following maxillary sinus operations 562
upper adenoidism and abnormalities in conformation of nasal septum and.... 89
Jugular Vein, bilateral resection, for bilateral sigmoid sinus thrombosis (otitic) *58

Kopetzky, S. J.: Acute and chronic otitis media and sinus thrombosis.....*241

Labyrinth, cooperation or intereference of reflexes from other sense organs with those evoked from.....279, 464
cranial injury followed by involvement of cochlea and..... 363
frog, ablation experiments on.....279, *281
indications for labyrinthectomy..... 450
nystagmus and strabismus in case of syphilis of vestibular apparatus..... 450
partial resection by Voss method..... 540
pelvic reflexes of eyes in man and their significance for weak turning test of vestibular apparatus 178
reactions induced through ductus endolymphaticus and aqueductus cochleae *137, 273
saccus endolymphaticus and its relation to labyrinthine muscle tonus..... 365
vestibular disturbance 545
Laryngitis (nondiphtheritic), membranous tracheobronchitis and 268

PAGE

Larynx, aspiration of tooth prosthesis into 86
biopsy in suspicious growths of..... 266
carcinoma of, treated with radium; analysis of 30 cases.....*151, 566
disorders of..... 346
excision, case of..... 357
stenosis; its relations to tracheotomy.... 556
tuberculosis, diagnosis and treatment of 269
tuberculosis, removal of epiglottis..... 346
tuberculosis, treatment by surgical intervention in superior and inferior laryngeal (recurrent) nerve; report based on 79 cases.....*479
tuberculosis, treatment with galvanocautery; indication; results; technic.. 453
Lateral Sinus, thrombosis of, complicating acute mastoiditis 265
Leukemia, myeloblast, necrosis of palate as primary symptom of; findings in throat in aleukemic lymphadenosis... 345
Lipiodol Oil: See under Bronchoscopy; Bronchus, roentgen study; Injections, intratracheal; Lungs, roentgen study; Respiratory Tract; Sinuses, nasal
Lischkoff, M. A.: New procedure for closure of nonspecific perforations of nasal septum *342
Lung, abscess, involving entire right inferior lobe; treated successfully with suction through bronchoscope.....*334
chronic nonspecific infections of; bronchoscopic and esophageal phases..... 548
roentgen study, radiographic exploration of broncho-pulmonary system by means of lipiodol 354
Lupus of nose and upper air passages treated by radium..... 350
of face, treatment of..... 457
Lymphadenosis, aleukemic, necrosis of palate as primary symptom of myeloblast leukemia and findings in throat in case of..... 345

MacCready, P. B.: Bilateral paralysis of adductors of vocal cords of organic origin; Landry's paralysis.....*122
McCullagh, S.: Radium in polypoid ethmoiditis *215, 551
McMahon, B. J.: Pathology of sphenoethmoidal sinusitis *310
Mandelbaum, M. J.: Easier method of introducing esophagoscope *307
Mastoid, roentgen-ray picture of, its clinical interpretation 85
surgery, indications for opening mastoid process in acute middle ear suppuration 343
surgery, pathology and surgery of eustachian tube; with special reference to value of closing it.....*189

PAGE

Mastoiditis, acute, streptococcic infection in 93
acute, thrombosis of lateral and cavernous sinuses complicating..... 265
empyema; warning concerning the term "mastoiditis" 541
primary osteomyelitis of mastoid bone (traumatic); review of literature..... 364
zygomatic, without clinical otitis media*300
Maxillary Sinus, chronic suppuration, new procedure in treatment of, in children*521
malignant tumors of antrum of Highmore; end-results of treatments...*201, 552
surgery, peridacryocystitis and periosteomyelitis of superior maxilla following 562
Mediastinitis, acute suppurative.....*512
Medicolegal importance of microscopic investigation of temporal bone..... *28
Meningitis, intradural complications of aural and nasal origin; survey of recent literature *163
Mercurochrome-220 soluble, intravenous use of, in septicemias..... 271
Mesenchyme, pathological changes in, of middle ear of fetuses, or mesenchyme of human cavum..... 467
Miller, J. W.: Extensive lung abscess involving entire right inferior lobe; case treated successfully with suction through bronchoscope *334
Moersch, H. J.: Hysterical dysphagia....*112
(correction) 239
Myerson, M. C.: Tonsillectomy with tonsillectome *425
Myringitis bullosa, etiology of.....182, 260

Nasopharynx, atresia of..... 559
Needle in cervical region tolerated for 5 months *520
Needle Holder, tonsil, new.....*338
Neuralgia, glossopharyngeal 455
Neuritis, optic, in relation to sinusitis.... 179
retrobulbar, due to frontal sinusitis..... 88
New, G. B.: Malignant tumors of antrum of Highmore; end-results of treatments *201, 552
Nose, choanal polyp.....181, 259
etiology of, atresia of posterior choana.. 180
obstruction, unusual eye and systemic complications of 359
polyp, radium in polypoid ethmoiditis; report of cases *215, 551
Nystagmus and strabismus in case of syphilis of vestibular apparatus..... 450
experimental, influence of blood pressure alterations on..... 447
miners' 354
pelvic reflexes of eyes in; significance for weak turning test of vestibular apparatus 178

PAGE

Ophthalmia, sympathetic, cured after exenteration of nasal accessory sinuses... 347
Optic Nerve, external operation on ethmosphenoidfrontal group of sinuses under local anesthesia; technic for removal of part of optic foramen wall for relief of pressure on optic nerve *377
influence of negative pressure in sphenoid on 555
injury of 355
Osteitis mandibulae with brain complications 457
Osteoma of septum, papillitis, headache and mental depression from..... 87
Osteomyelitis, primary, of mastoid bone (traumatic) 364
Otitis Media, acute and chronic, and sinus thrombosis *241
acute, associated with bacteremia.....*107
acute suppurative, management of, in home 186
indications for opening mastoid process in 343
prognosis of, in children; review of 500 cases 446
roentgen-ray treatment of tuba auditiva 86
surgery of middle cranial fossa..... 343
zinc ionization in.....446, 447, 448
zygomatic mastoiditis without.....*300
Otolith Apparatus, disease symptoms in region of 82
pathology of 538
Otosclerosis 280
cartilage vessel systems and otosclerotic areas 254
in etiology of progressive deafness *127, 469
is there an endocrine factor in?..... 544
Ozena, new surgical procedure in treatment of atrophic rhinitis, with and without accompanying ozena..... 458
treatment of 351

Palate, necrosis of, primary symptom of myeloblast leukemia and findings in throat in case of aleukemic lymphadenosis 345
Papillitis, headache and mental depression from osteoma of septum..... 87
Paralysis, Landry's, bilateral paralysis of adductors of vocal cords of organic origin *122
ulnar, contractured; relieved by treatment of nasal (sphenopalatine) ganglion *493
Petrous Bone: See Temporal Bone
Pharynx, carcinoma of laryngopharynx, treated with radium; analysis of 30 cases *151, 566
hemolytic streptococci in, of infants and children 255

Pharynx—Continued PAGE
treatment of lateral pharyngeal bands for deafness by roentgen ray; report of 100 cases 460
Phenobarbital in prophylaxis and treatment of acute cocaine intoxications.....*304
Phlebitis of sinus cavernosus.....181, 258
Plastic surgery.....*427
Pratt, F. J.: Results of tonsil operations; questionnaire report *142
Pregnancy, nature of hardness of hearing during 344
Procaine hydrochloride, experimental carotid injection of..... 456
Proetz, A. W.: Displacement irrigation of nasal sinuses; new procedure in diagnosis and conservative treatment..... *1
Special syringe for displacement irrigation of nasal sinuses.....*424
Recurrent Nerve, physiology..... 86
tuberculosis of larynx; treatment by surgical intervention in superior and inferior laryngeal (recurrent) nerve....*479
Reflexes, cooperation or interference of, from other sense organs with those evoked from labyrinths 279, 464
pelvic, of eyes; significance for weak turning test of vestibular apparatus... 178
Respiratory Tract, demonstration of lower air passages by intratracheal injections of lipiodol..... 264
diseases, ephedrine in nasal disturbances.*240
disease, membranous tracheobronchitis and laryngitis (nondiphtheritic) 268
disease, relation of paranasal sinus infection to 546
Rheumatic Fever, treatment..... 353
Rhinitis: See also Ozena
atrophic, new surgical procedure in treatment of, with and without accompanying ozena 458
chronic nasal discharge in infants..349, 350
Richards, G. L.: Improved aural speculum.*525
Richardson, C. W.: Cultures from tonsils *120, 558
Robinson, G. A.: Radium in polypoid ethmoiditis *215, 551
Roentgen Ray, picture of mastoid and its interpretation 85
treatment of lateral pharyngeal bands for deafness by; 100 cases..... 460
Roentgenography, unusual sinus roentgenogram obtained by oral rhinoscopy.... 363
Roy, J. N.: Needle in cervical region tolerated for 5 months.....*520

Sarcoma, carcinosarcoma, diagnosis and nomenclature, and apparently healed carcinoma of upper jaw..... 263
malignant tumors of antrum of Highmore; end-results of treatments.....*201
recovery from tubal deafness caused by.. 349
Schugt, H. P.: Tuberculosis of larynx; treatment by surgical intervention in superior and inferior laryngeal (recurrent) nerve *479
Seasickness 182
Septicemia, intravenous use of mercurochrome-220 soluble in..... 271
Septum, adenoidism and abnormalities in conformation of upper jaw and..... 89
fate of reimplanted cartilage of..... 89
new procedure for closure of nonspecific perforations of *342
osteoma of, papillitis, headache and mental depression from..... 87
Sewall, E. C.: External operation on ethmosphenoidfrontal group of sinuses under local anesthesia; technic for removal of part of optic foramen wall for relief of pressure on optic nerve..*377
Shambaugh, G. E.: Occurrence of otosclerosis in etiology of progressive deafness *127, 469
Sheehan, J. E.: Plastic surgery.....*427
Sigmoid Sinus, thrombosis, bilateral jugular resection for bilateral sigmoid sinus thrombosis (otitic) *58
thrombosis, typhoid fever simulating.....*298
Sinuses: See also Cavernous Sinus; Ethmoid Sinus; Frontal Sinus; Lateral Sinus; Maxillary Sinus; Sigmoid Sinus
disease in children..... 95
external operation on ethmosphenoidfrontal group of sinuses under local anesthesia; technic for removal of part of optic foramen wall for relief of pressure on optic nerve.....*377, 565
nasal, accessory, embryologic study of formation of 563
nasal, accessory, foreign bodies in..... 361
nasal, accessory, pathologic changes in.. 564
nasal, accessory, sympathetic ophthalmia cured after exenteration of..... 347
nasal, displacement irrigation of; new procedure in diagnosis and conservative treatment *1
nasal, iodized oil in diagnosis of disorders of *223
nasal, syringe for displacement irrigation of *424
posterior, simple method for introducing fluid into, without causing trauma.... 560
unusual sinus roentgenogram obtained by oral rhinoscopy 363
Sinusitis: See also Ethmoiditis; Frontal Sinusitis
chronic nasal discharge and, in children.. 350
optic neuritis in relation to..... 179
paranasal, in infants and in young children 545
relation of paranasal sinus infection to disease of lower respiratory tract..... 546
spheno-ethmoidal, pathology of.....*310
suppurative, in infancy 547

PAGE

Smith, O. C.: Audio-controller *160
Society Meetings, local.....445, 536
national 445, 536

SOCIETY TRANSACTIONS:
American Laryngological Association, Scientific Session 551
American Laryngological, Rhinological and Otological Society..... 264
American Otological Society..... 459
Chicago Laryngological and Otological Society 357, 458
College of Physicians of Philadelphia, Section on Otolaryngology..... 93
College of Physicians of Philadelphia, Section on Otology and Laryngology and Section on Otology and Laryngology of New York Academy of Medicine, joint meeting of 186
Specimens, two anatomic preparations of temporal bone for teaching purposes..*412
Speculum, aural, improved.....*525
Speech, defects, sigmatism observations.... 184
interpretation of, by tactual and visual impression *228, 462
new cannula for tracheotomy..... 549
postadenoidal *296
sounds, interpretations of, by means of their tactual correlates..... 366
Spheno-ethmoidal sinusitis, pathology of...*310
Sphenoid Sinus, influence of negative pressure in, on optic nerve..... 555
Sphenopalatine Ganglion 187
contractured ulnar paralysis; relieved by treatment of nasal (sphenopalatine) ganglion *493
Spinal Cord, otogenous abscess of..... 182
Strabismus in syphilis of vestibular apparatus 450
Streptococcus, hemolytic, in pharynx and tonsils of infants and children..... 255
hemolytic, throat infections, bacteremia with *97
infection, in acute mastoiditis..... 93
Sweat Bath, new head sweat bath..... 549
Syphilis, primary, of lingual tonsil..... 179
Syringe for displacement irrigation of nasal sinuses *424

Tait, J.: Ablation experiments on labyrinth of frogs.....*281
Teeth, focal infection from dental standpoint 277
Temporal Bone, anatomic preparations of, for teaching purposes.....*412
erosion of petrous bone by acoustic nerve tumor; demonstration by roentgen ray.*515
medicolegal importance of microscopic investigation of *28
pathological studies of..... 176

PAGE

Throat, carcinoma of, treated with radium; analysis of 30 cases.....*151
infections, acute hemolytic streptococcic, bacteremia associated with..... *97
necrosis of palate as primary symptom of myeloblast leukemia and findings in throat in aleukemic lymphadenosis.... 345
tuberculosis of *527
Thrombosis: See also under names of sinuses as, Cavernous Sinus; Lateral Sinus; Sigmoid Sinus
is an otogenous sinus thrombosis more frequently located on right than on left side? 550
sinus, acute and chronic otitis media and.*241
Thymus gland *495
Tonsillectome, tonsillectomy with.....*425
Tonsillectomy by nerve block anesthesia....*421
choice of methods in chronic tonsillitis; tonsillectomy in adults and children... 452
diphtheria following 255
experimental carotid injection of procaine hydrochloride 456
foreign body accidents during..... 188
Ludwig's angina and mediastinal abscess following 274
new tonsil needle holder and artery hemostat *338
results of; questionnaire report.....*142
with tonsillectome *425
Tonsillitis, angina agranulocytotica..... 256
chronic, treatment, choice of methods in. 452
Tonsils, cultures from.....*120, 558
foreign bodies in, nonendoscopic cases of *489
hemolytic streptococci in, of infants and children 255
mixed salivary tumor in tonsillar region.. *14
primary syphilis of..... 179
Touch, interpretation of speech by tactual and visual impression.....*228, 462
interpretation of speech sounds by..... 366
relation of tactile sense impression and hearing perception 269
Towne, E. B.: Erosion of petrous bone by acoustic nerve tumor; demonstration by roentgen ray.....*515
Tracheotomy, laryngeal stenosis and..... 556
new speech cannula for..... 549
Tremble, G. E.: Two anatomic preparations of temporal bone for teaching purposes *412
Tuberculosis: See Ear, middle; Larynx, tuberculosis; Throat, tuberculosis
Tumors, mixed salivary, in tonsillar region *14
Turbinate Bones, congenital absence of, with precocious ossification of limb bones in stillborn female..... 349
inferior, treatment of congested and enlarged 454
Tympanic Tube, alcohol douches with, in cholesteatoma 85

PAGE

Typhoid fever simulating sigmoid sinus thrombosis *298
Typhus, pathohistologic changes of hearing organ in 345

Vertigo, reactions induced through ductus endolymphaticus and aqueductus cochleae *139
Vestibular Apparatus: See Labyrinth
Vocal Cords, bilateral paralysis of adductors of, of organic origin; case of Landry's paralysis *122

PAGE

Wassermann Test, local diagnostic value of, in cerebrospinal fluid..... 355
Wasson, W. W.: Thymus gland.....*495
Watson, W. R.: Aphonia..... *46
Weinstein, M. A.: New tonsil needle holder and artery hemostat.....*338
Wood, G. B.: Tuberculosis of throat.....*527

Yerger, C. F.: Otologic complications of basal skull fracture..... *35

Zygoma: See under Mastoiditis